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The Spiroboloidea (Diplopoda) of the eastern half of Southern Africa*

by

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SYNOPSIS

This paper is an account of the Spiroboloidea of Southern Africa east of 24° longitude, where five genera are found, *Metiche*, *Centrobolus*, *Hadrobolus*, *Microbolus* and *Chersastus*. All except *Chersastus* are represented by single species in the South African region; *Chersastus* on the other hand consists at the present time of 42 species widespread from the Cape Peninsula to Beira and a revision of the forms occurring in the eastern half of Southern Africa has been attempted; a key to these species is given.

Various generic features of *Chersastus* are discussed and notes on the distribution and ecology of the genus are given.

Fourteen new species of *Chersastus* are described, *immaculatus*, *inyanganus*, *decoratus*, *tricolor*, *rugulosus*, *bifidus*, *transvaalicus*, *richardi*, *albitarsus*, *validus*, *sanguinipes*, *lugubris*, *fulgidus* and *pusillus*. Notes or supplementary descriptions of some of Attems' and Schubart's Natal species are provided.

A new genus *Microbolus* from Mocambique is proposed with a single species *broadleyi*. A new species of *Metiche*, hitherto known from tropical East Africa, is described from Mocambique; the genus is recorded from the South African region for the first time, the other species being located in Tanganyika (two) and Somaliland (one).

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INTRODUCTION

In the following paper I have attempted to review the Spiroboloidea of Southern Africa which occur east of longitude 24, a line which roughly divides the southern end of the continent into equal halves. The area dealt with would thus include species obtained by the Lund University Expedition to South Africa of 1950-51, those collected by Wahlberg

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(1839-1842), Carlgren 1935 and Hanstrom 1948, as well as those described by Attems in the collections of the South African and Natal Museums (1928 and 1934).

The great majority of species described or recorded here, however, are based on the massive material, belonging almost entirely to the genus *Chersastus*, which has accumulated in the Natal Museum over a period of 31 years and has been derived from the Eastern Cape, Natal-Zululand, Swaziland, the Transvaal, Rhodesia and Mocambique; in most of these provinces new forms have been found and described. The work is thus in one sense a revision of the genus *Chersastus* in the eastern half of Southern Africa.

The systematics of *Chersastus* have previously been dealt with in four important papers each of which constitutes a distinct advance in our knowledge of the genus. Attems first attempted to describe the South African fauna in his monograph of 1928 and the Natal fauna in 1934. Jeekel's paper of 1956 was another step forward and finally Schubart in 1966 brought the taxonomics of the genus up to date.

Four papers by the older authors are of dubious value as in most cases they are without either illustrations or locality data. Porat described six species in his two papers of 1872 and 1893 and in all except one no exact localities were given so that these will never be known with certainty; the same applies to two other species, one described by Brandt (1841), the other by L. Koch (1865) although in the case of the latter, the locality Algoa Bay (= Port Elizabeth?) is known.

I am greatly indebted to the following collectors in Natal: Dr. and Mrs. A. C. van Bruggen, Mr. and Mrs. B. R. Stuckenberg; Mr. O. Bourquin, Mrs. N. Gardiner and the late caretaker of the Natal Museum, Mr. W. G. Rump. Dr. D. G. Broadley, Director of the Umtali Museum, Rhodesia, deserves my special gratitude for the interest he has taken in collecting Myriopoda in general in such little known regions as Rhodesia and Mocambique. No less than four new species and a new genus from these two provinces have been contributed by him.

I am further deeply indebted to Miss L. Kelsall and to Mr. and Mrs. Ian Gardiner of Pietermaritzburg for numerous excellent colour photographs from which those appearing on the colour plate have been chosen.

THE GENUS *CHERSASTUS* ATTEMS

General Remarks

Of the five spirobolid genera occurring in Southern Africa, *Metiche*, *Hadrobolus*, *Centrobolus*, *Microbolus* and *Chersastus*, *Metiche*, *Hadrobolus* and *Centrobolus* consist of large species (length about 100 mm), *Microbolus* of one small species while the widespread South African genus *Chersastus* may be said to be composed of moderate sized species seldom exceeding 60 mm in length, often not more than 40 mm; the number of segments is also small, between 38 and 46.

The genus is further noteworthy for its bright colouring which in many species assumes a pattern, being red in most species with variegations of black bands (*inscriptus*, *anulatus*, *tricolor*) or spots (*vastus*, *vulpinus*); occasionally with yellow markings on a deep red or blackish background (*digrammus*, *decoratus*); in some species the red background colour is brilliant and extremely attractive (*ruber*, *vastus*). There is no appreciable difference in the colour patterns of the two sexes but in a few species the sculpture of the male and female tergites is markedly different (*silvanus*, *tricolor*, and perhaps *striolatus* and *strigosus*), that of the female being much stronger. The other secondary sexual characters are similar to those of most other Diplopod families in South Africa, the body of the male being always more slender (at times much more) than that of the female, his movements more rapid and energetic.

Chersastus is characterised by the presence of a pair of paramedian semicircular impressions at the anterior margin of each tergite, the scobinae, which are absent in the large-bodied genera *Metiche*, *Centrobolus* and *Hadrobolus*, but present in the small *Microbolus*. Schubart and Attems maintain that they are sometimes absent but while there are few species in which they are not found, in these they may be so small or weakly impressed that they can be virtually regarded as absent.

The legs vary considerably in length; in some species or groups of species they are very short, not reaching the lateral margins of the tergites when extended sideways, in others quite long and slender. The presence or absence of tarsal pads in a variable number of posterior legs seems also to be a good specific character as well as the reduction in size of the pad itself in relation to the length of the tarsus; in some species the pad thus exceeds the length of the tarsus, in others it is shorter.

Schubart and Jeekel have decided in favour of retaining the old species of Porat, described as long ago as 1872, on the ground that the colour pattern is a sufficiently good character for determining the species, and have synonymised a number of Attems species with Porat's older ones. While agreeing with this assumption it must be pointed out that specimens in the Natal Museum collected only 30 years ago, have become faded in alcohol and lost their original colour pattern; Porat's species have been almost 100 years in alcohol and it is doubtful if much of the original colour can have remained. It is impossible to locate the type locality of most of Porat's species, which makes the task of correlating and synonymising Attems' with Porat's types a difficult and uncertain one. It is impossible to state the extent of the territory which the label "Caffraria" covers, this being the locality given for Porat's type specimens which were collected by C. A. Wahlberg from 1839-1842. Jeekel (1956, p. 94) gives a rough distribution map of the species of *Chersastus* which show Porat's species, numbered 12-17, as occurring in Tembuland, i.e. that part of the Transkei to the north or north west of Umtata. According to Brinck's excellent introduction to the series, *South African Animal Life*, Vol. I, pp. 11-61, which summarises the travels of various Swedish naturalists in Southern Africa, Wahlberg could never have been near these parts; the nearest he got to the Transkei was probably in May 1839 when he spent 11 days at Port Elizabeth making some excursions beyond the nearby Swartkops river. Wahlberg spent most of his collecting time in Natal and Zululand, especially the latter and it is more probably that most of Porat's types came from the last-named area. In his paper of 1872 Porat described another Polydesmid millipede, *Polydesmus humberti*, also from "Caffraria", which is certainly a *Gnomeskelus;* from the measurements given and illustrations of the legs of the male, this species would in all probability be a variety of *G. tuberosus* Attems, a litoral form common and fairly widely distributed in Natal and Zululand. Even if Porat's types came from Natal-Zululand, this is a very large region and many species of *Chersastus* are found in it, since the genus consists essentially of highly localised forms.

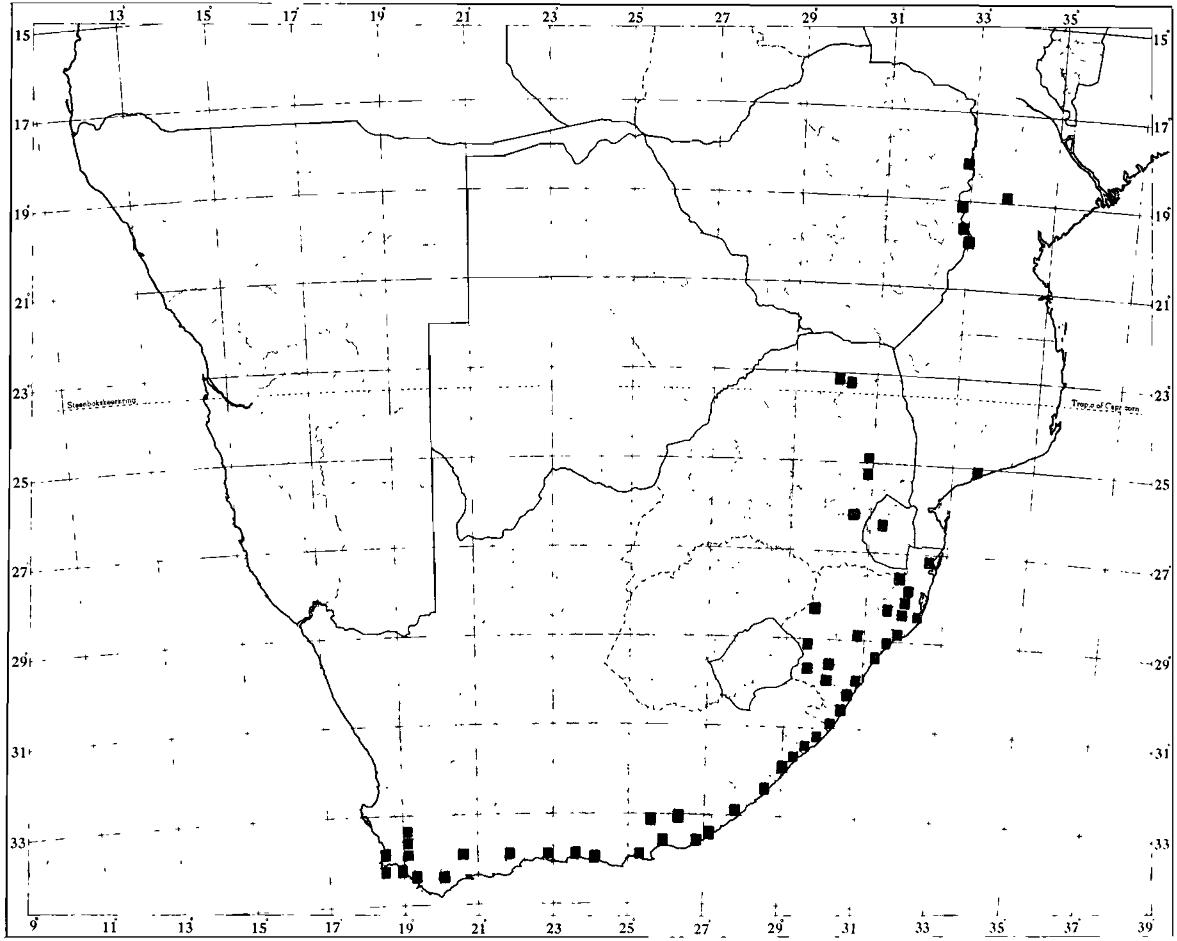


Fig. 1. The distribution of the genus *Chersastus* Attems in Southern Africa (South of lat. 17° S).

I am thus of the opinion that with regard to Porat's Caffrarian species at least, those which are based on a female specimen only should be omitted from the list of valid names but that it would be better still if all of them were to be removed; the species concerned are *strigosus, coriaceus, formosus, saussurii.* The type locality of Brandt's *elegans* seems also doubtful, being not mentioned by Porat in his redescription (1872, p. 19) of the species, and I doubt if it could be established as conspecific with *anulatus* Attems; Porat's *tesselatus* from "Caffraria" was collected by Wahlberg who spent some time at Port Elizabeth collecting beyond the Swartkops river; as this is also the type locality for Kochs *litoralis* of 1841, there is, as suggested by Jeekel (1956, p. 96), some probability that the two are identical. Porat's other specimen from the Cape Peninsula on the other hand was, as surmised by Pocock in his description of 1893, p. 139, much more likely to be the same species as *digrammus* (Pocock).

Distribution

The genus is confined to the temperate South African subregion, its northern limits on the east coast of southern Africa being about 17° latitude S. It occurs in all the forests of the coastal belt from the Cape Peninsula to Beira in Mocambique.

While the coastal forests of the South-West and Eastern Cape are mist belt temperate forests, those of the Transkei, Natal, Zululand and Mocambique are of a somewhat different character, being better described as East Coast Bush. They are developed almost entirely in a narrow strip of the litoral on a dune sand substratum, are more tropical in aspect and composition than those to the west of them; there is a summer rainfall of 30-40 inches, a uniform temperature and an absence of frost; the component trees of the coastal bush with their abundant creepers and lianes, while not usually reaching a height of more than 35 feet, provide a dense covering with abundant shade and humidity at ground level. As essentially shade-loving Diplopoda, the members of the genus are especially well represented in these litoral forests of the eastern half of the subcontinent.

While there seems to be a definite preference for low altitudes the range of the genus must now be extended by the recent discovery of a new species in the Natal Drakensberg at an altitude of about 6,000 ft., another from the Transvaal extension of the Drakensberg escarpment at Mariepskop and Louis Trichardt between 6,000 and 7,000 ft. altitude. Two species are thus now described from the Transvaal, a province from which none had been previously known. It is noteworthy that no *Chersastus* have been found in the whole of the Kruger National Park, a low altitude region of the Transvaal which has been well investigated for Myriopoda (Lawrence, 1967). Although many parts of the Transvaal lowveld are characterised by a sandy substratum not unlike that of the litoral of Natal-Zululand, the much lower and less dependable rainfall makes impossible the production of really dense forest with the requisite conditions of shade and moisture; the few species found in the Transvaal and eastern boundary of Rhodesia are thus outliers or continuations of the Natal-Zululand fauna and are found on the northern extensions of the Drakensberg escarpment in montane forests which are essentially similar to those characteristic of Natal. Species of *Chersastus* are thus found as far north as the Rhodesian forests of Vumba and Inyanga, 150 miles inland from the coast; the most northern limit along the eastern litoral is probably Inhambane or perhaps even Beira.

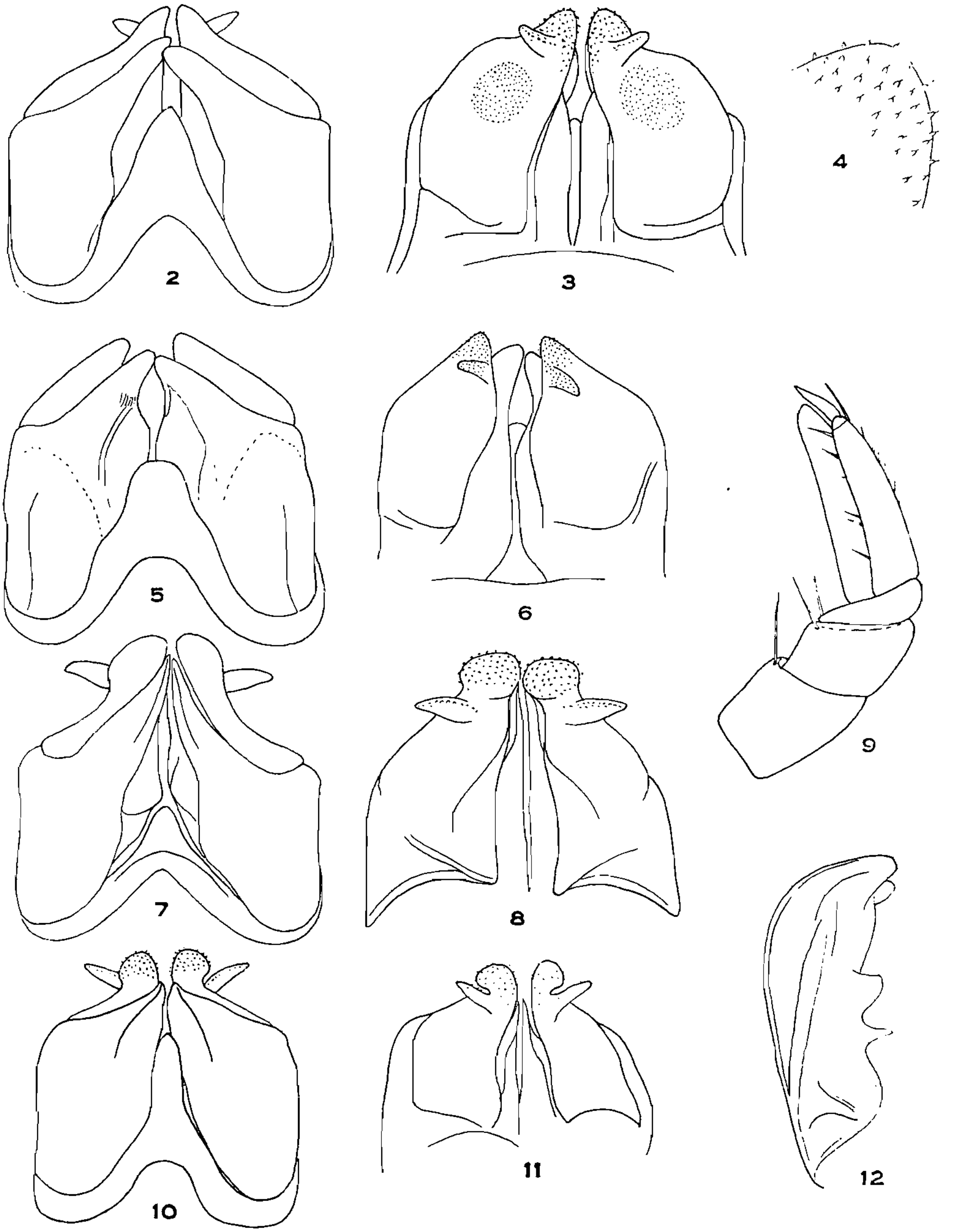


Fig. 2-12. *Chersastus immaculatus* n. sp♂: 2 and 3, anterior gonopods, oral and aboral views; 4, apex of distal segment of same enlarged.
C. inyanganus n. sp. ♂: 5 and 6, anterior gonopods, oral and aboral views; 7 and 8, the same of *C. decoratus* n. sp ♂, 9 segments III-VI of an anterior leg, *C. decoratus*, *C. tricolor* n. sp ♂: 10 and 11, anterior gonopods, oral and aboral views; 12, posterior gonopod.

A note on colouring and habits

It can be stated as a fairly safe generalisation that all the brightly coloured (aposematic) species are found living in the coastal bush or forests of the litoral and favour vegetation growing on a sandy dune substratum; such species are *anulatus*, *vulpinus*, *vastus* and *ruber*; in these the background colour is a brilliant red, the head and legs deep black in contrast or the body segments variegated with black spots and bands. Differences of habit in the various species of *Chersastus* may perhaps allow them to be placed in different groups; brightly coloured forms such as those mentioned above and the Rhodesian species *immaculatus* and *validus*, live far more in the open during the day, climbing shrubs and fairly high trees with ease; the legs of these arboreal forms are in general relatively longer in both sexes than those of the more cryptic species; they secrete far more readily and copiously from the odoriferous glands so that when handling them the fingers become covered with yellow-brown secretion resembling iodine; in one species, *C. vastus*, at Port St. Johns, actual ejection of the liquid in the form of a very fine jet, has been observed (Lawrence 1953, p. 191). In contrast, such species as *inscriptus*, *lawrencei* and *tricolor* are much more cryptic in habit, more sluggish, living buried in the leaf humus of the forest floor and seldom found walking in the open or climbing trees during the daylight hours; these in general are darker and more sober coloured species, less distinctive and less aesthetically attractive. Most of the less brightly coloured species live at inland localities and at higher altitudes than the aposematic ones.

DISCRIPTIONS OF NEW SPECIES

Chersastus Attems 1928

Chersastus Attems 1928, Ann. S. Afr. Mus. 26, p. 300.

Chersastus immaculatus, n.sp. (Figs. 2-4)

Holotypes, 1 ♂, 1 ♀, paratypes 10 ♂♂♀♀ (NM. 9339), Garuso, Mocambique, collected D. G. Broadley, Dec. 1960.

♂ *Colour:* Body segments, head and collum entirely red, only the pores surrounded by a small area of blackish infuscation, metazonites darker red than the mezo- and prozonites; antennae, legs, yellow with a light orange tinge, the three basal segments of the legs brown with a dull olive green tinge (becoming progressively a little darker basally) these segments contrasting with the three distal yellow segments, the contrast more marked in the posterior half of the body.

Head and body: Head, collum and tergites quite smooth and shiny, the transverse suture of the tergites well defined; eyes with 42 ocelli, twice their longest diameter apart; seen from above in profile the metazonites are distinctly raised and wider than the prozonites, especially in the males, being also slightly convex, not flat; scobinae weakly impressed, about twice as wide as long; anal valves with very strongly raised, thick inner margins, a rather deep depression separating them from the rest of the surface; anal scale triangular, bluntly angular posteriorly.

Legs: All except the first and the last six pairs with pads, the pads not quite reaching the apex of tarsus in anterior legs but not decreasing in length in the posterior ones; segment V with 1 apical bristle.

Gonopods: Anterior gonopod seen in anterior view as in fig. 2; posterior view, fig. 3, the distal joint covered at its apex with evenly distributed conical papillae each surmounted by a short triangular spine, fig. 4.

Dimensions: Length of ♂ 49, width in the middle 4.7 mm, a little less in anterior half; length of ♀ 60, greatest width 7 mm. Both ♂ and ♀ with 39 or 40 segments.

♀. The female does not differ in its colouration or sculpture from the male.

Additional records: Numerous specimens of both sexes from the Chirinda forest, Mt. Silinda (NM. 4968, 4969, 6243, 8195, 8947, 8958); Chimanimani Mt. (NM. 7224), both localities in Rhodesia. In Portuguese E. Africa numerous specimens from Gorongoza (NM. 6791, 9340), and the Amatonga forest, near Vila Pery, Mocambique (G. Arnold).

Remarks: Specimens from Gorongoza are a little darker with the antennae reddish-brown; in a few individuals there is a faint medio-dorsal stripe composed of an ill-defined blackish dot at the junction of each meta- and mesozonite. The species is most closely related to *splendidus* Attems but differs in the detailed structure of the gonopods, the presence of scobinae and in the last 6 pairs of legs being without pads. Arnold comments on the specimens from the Amatonga forest, "crawling over plants and trees".

Chersastus inyanganus n.sp. (Figs. 5, 6)

Holotypes, 1 ♂, 1 ♀, paratypes 8 ♂♂, 9 ♀♀ (NM. 8269), Inyanga village, Rhodesia, alt. 5,000 ft. collected D. G. Broadley, Nov. 1961.

♂. *Colour:* The body in general dark red with three well defined longitudinal black stripes. Head and collum red, the latter with an ill-defined blackish spot in the middle of posterior margin; all remaining somites with a sharply demarcated black dorso-median stripe consisting of a parallel sided bar occupying the meta-, meso- and most of the prozonite, the stripe continuous from the tergite behind the collum to anal segment; sides with a black stripe composed of a large spot surrounding each pore; mesozonites in posterior half of body black below the pore but red above, whole of body otherwise red, the anal segment distinctly lighter, the covered part of prozonite yellow-brown; legs yellow with an orange tinge, the pads white; antennae a little more reddish than the legs.

Head and body: Collum, head and tergites quite smooth, shiny, without creases or striations; eyes small, with about 40 flat ocelli, a little more than twice their greatest width apart; scobinae present but extremely faint, much wider than long; pores situated near the suture, without a short furrow just above them directed posteriorly; metazonites obviously a little wider than the rest of segment giving the animal a ringed appearance; anal segment with microscopic dust-like granulation at the sides but smooth above, anterior borders of the valves near their junction with the rest of the anal segment with similar granulations; inner margins of valves thick but not strongly raised, a very shallow depression separating them from the rest of the surface; sternites with 7-8 distinct fine furrows.

Legs: Not long, reaching the lateral margin of body when extended sideways, the tarsi rather short and thick set; all except the first two pairs with distinct pads; the pads rounded, surpassing the apex of tarsus, not decreasing in length in posterior legs; segment V with 1 apical bristle.

Gonopods: Anterior gonopod as in fig. 5, anterior view, fig. 6 posterior view.

♀. *Colour:* Similar to that of ♂, no fine granulation on the anal segment or anal valves.

Dimensions: Total length of ♂ 40, greatest width 4.5 mm; of ♀ total length 43, width 5.2 mm. Male with 39 segments, female with 41 or 42.

Further material: Numerous specimens of both sexes from Pungwe Gorge, Inyanga (±5,000 ft. alt.): in some of these the medio-dorsal black stripe is less marked or even absent.

Chersastus tricolor n.sp. (Figs. 10-12)

Holotypes, 1 ♂, 1 ♀, paratypes 2 ♂♂ (NM. 3992), Champagne Castle, Drakensberg Mts. Natal, alt. 7,000-7,500 ft., collected R. F. Lawrence, Sept. 1943.

♂. *Colour:* Body in general transversely banded in three colours, red (metazonites), black (mesozonites), dirty white (prozonites), the black band sharply defined, wider than those of the meta- and prozonites (which are subequal) and passing backwards well beyond the transverse suture. Head almost completely black, collum red with a wide black transverse band in the middle (not reaching the sides) leaving a red band on the anterior and posterior margins, the latter not as wide as the anterior, the anterior less wide than the middle black band; in the first two or three tergites the red metazonite equal to or a little wider than the black mesozonite band, the latter increasing progressively in width backwards; antennae black like head, legs a little lighter, mottled black and dark red, the basal segments somewhat lighter; anal segment reddish black, valves a little more reddish.

Head and body: Head and collum shiny, the latter bluntly triangular at the side with a weak marginal furrow disappearing just before reaching the level of the eye; eyes small with about 37 ocelli, about 2½ times their longest diameter apart; metazonites more or less smooth and shiny; in middle and posterior segments with an irregular band of minute punctures, about three deep and more numerous and distinct towards the pore; mesozonites more strongly sculptured than metasomites, with numerous irregular broken encircling lines becoming progressively more obliquely directed and intermixed with a few minute punctures and short striae, these lines and striae even more numerous below the pore; pores almost touching the transverse suture, each with a distinct furrow extending behind it to the posterior margin of the metazonite; inner margin of anal valves not raised at all, the whole surface flat, anal scale very bluntly rounded posteriorly. Scobinae very faint, wider than long.

Legs long, the tarsi fairly long and slender; the pads long and well developed on all except the first two and last six pairs of legs, reaching the apex of the tarsus (or almost) even in the posterior legs; segment V very short, with 2 apical bristles.

Gonopods: Anterior gonopods in anterior and posterior views as in figs. 10 and 11 respectively.

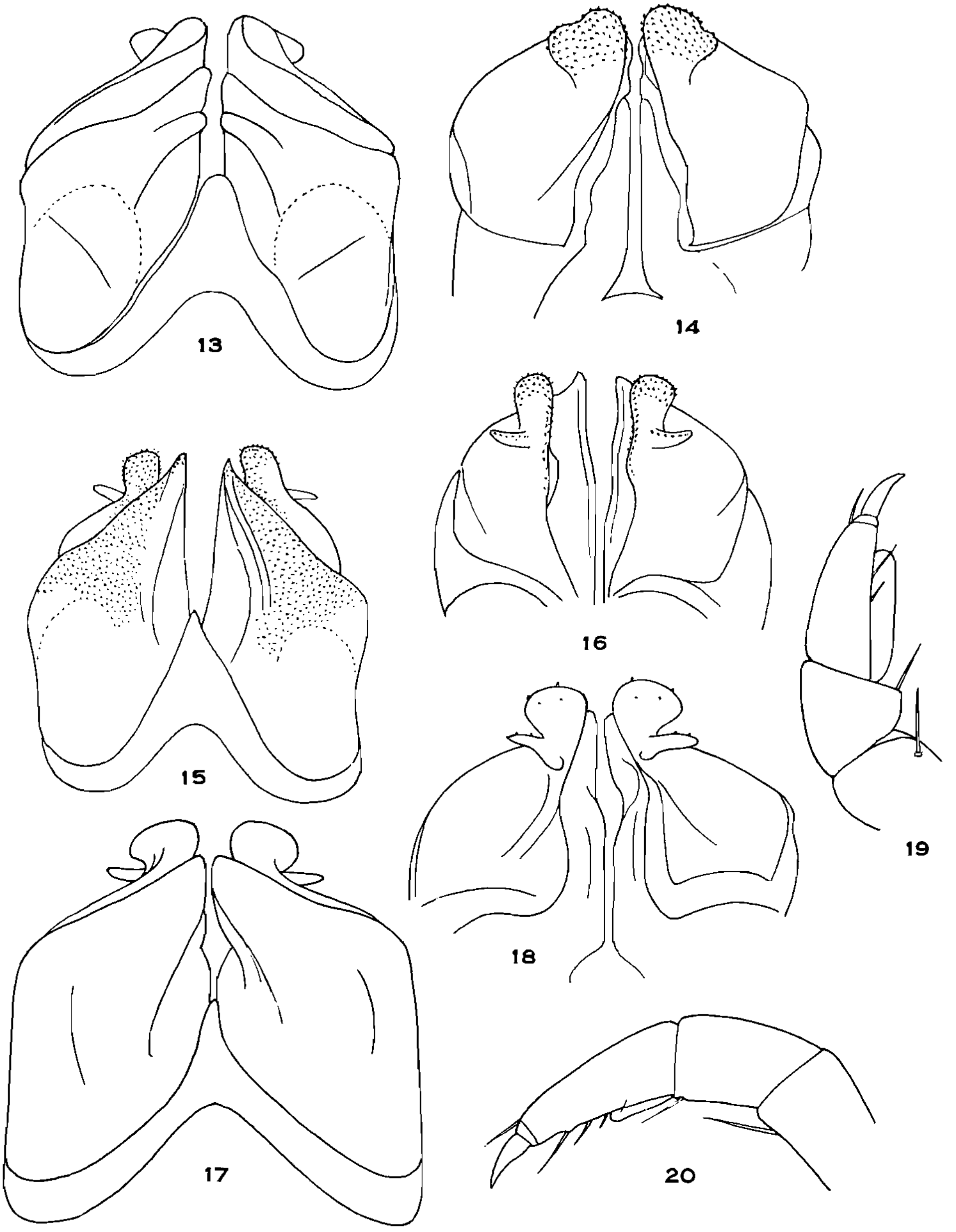
Dimensions: Total length 45, greatest width 4.5 mm. Both sexes with 43 segments.

♀. Colour similar to that of the ♂ but the whole body with a fine close sculpture giving the surface a dull satin sheen appearance somewhat as in *striolatus* Attems, not in general shiny as in the ♂; metazonites with fine, close, short, longitudinal striae mixed with fine

punctures, those of the mesozonites weaker, less regular, striatiform and shorter than the broken encircling furrows on the male mesozonite; transverse suture and the furrow behind each pore obliterated or faint, both metazonite and posterior half of mesozonite appearing finely granular; prozonites quite smooth. Collum not shiny, covered with short, irregular, anastomosing striae mixed with punctures, the sculpture much weaker than the tergites; inner borders of anal valves not raised, the slight depression between them and the rest of the surface with anastomosing irregular furrows; anal scale obtusely angular posteriorly.
Dimensions: Total length 37, width 5.2 mm.
Further material: Numerous specimens of both sexes from Champagne Castle Hotel at altitudes from 6,000-8,000 ft. (NM. 1660, 3486, 3451, 2224, 1680, 4476, 4008, 4400); 2 ♂♂ from Bulwer (NM. 1448).

Chersastus decoratus n.sp. (Figs. 7-9)

Holotypes: 1 ♂, 1 subadult ♀, paratypes 2 ♂♂ (NM. 8156), Ngomi forest, near Nongoma, Zululand, collected Dec. 1960, R. F. Lawrence.
♂. *Colour:* Unlike that of any other Natal or Zululand species, resembling in general *digrammus* Pocock, being in general black with longitudinal rows of yellow dots. Head, antennae, body and anal segments black, legs yellow; on each side two longitudinal rows of irregularly shaped yellowish dots (one on each somite), one row just above the pore, the other below it, the latter much less distinct than the former.
Head and body: Head smooth, shiny; eyes with about 30 ocelli, about 2½ times their greatest width apart; collum shiny with scattered punctures in anterior half and at the sides; tergites with metazonites smooth and shiny, in strong contrast to the mesozonites which are covered with a sculpture of short, longitudinal, parallel striae (stronger in the middle than at the sides), giving this part of the somite a shagreened appearance; in the posterior segments this sculpture encroaches backwards more and more on the metazonites so that in the last six and anal segments the whole tergite is sculptured. Prozonites in all segments smooth; scobinae well marked, not much wider than long, more than their width apart; transverse suture obsolete and no fine furrow just behind the pore. Anal segment including the valves roughened with a sculpture of minute punctures mixed with fine striae, giving it a finely granulated appearance; inner borders of valves slightly thickened but not raised at all, the whole surface flat.
Legs: Not long, reaching the lateral margin of the body or a little beyond it when extended; all except the first two pairs with a well developed pad passing well beyond the apex of the tarsus in anterior legs, reaching almost to the end of the claw; segment V very short, its width much greater than its length, with 1 apical bristle, fig. 9.
Gonopods: Anterior gonopod as in fig. 7 seen from in front, fig. 8 seen in posterior view.
Dimensions: Total length 43, width 4.5 mm. Number of segments 42 in both sexes.
♀ (Subadult). Colour as in ♂, sculpture of tergites much stronger. Head shiny but its posterior margin roughened with minute punctures and striae; punctures fairly dense in anterior half, scattered in posterior half of collum; whole of tergites sculptured as in ♂ but more strongly, only the posterior edges of the metazonites in the anterior tergites smooth and shiny, covered portion of prozonite smooth.
Dimensions: Total length 31, width 4.2 mm.



Figs. 13-20. *Chersastus transvaalicus* n. sp ♂ 13 and 14, anterior gonopods, oral and aboral views; 15 and 16, the same of *C. rugulosus* n. sp ♂; 17 and 18, the same of *C. richardi* n. sp. ♂; 19 and 20, the last two segments of the 8th and 57th legs respectively of *C. richardi* ♂.

Chersastus transvaalicus n.sp. (Figs. 13, 14)

Holotype, 1 ♂, paratypes 3 ♂♂ (NM. 7746), Mariepskop, E. Transvaal, alt. ± 6,000 ft., collected R. F. Lawrence, March 1960.

Colour: Head very dark red, antennae and legs light reddish brown, anal segment light red, valves yellowish red; collum lighter red than head with a broad black transverse band in the middle, wider than the anterior and posterior reddish remainder; metazonites and most of the mesozonites red, an ill-defined blackish median spot dorsally and a similar one (laterally elongate) surrounding each pore, thus three rows each forming a rather ill-defined stripe, the spots tending to become confluent; prozonites yellow.

Head and body: Head shiny with very weak vertex furrow, a transverse band of very faint sculpture behind the eyes; eyes with 40-42 ocelli, a little less than their greatest width apart; collum shiny with a few minute punctures laterally; metazonites in general shiny, smooth or with indistinct traces of longitudinal striae and microscopic punctures on the posterior segments; prozonites with a few broken and irregular encircling lines; pores without a posterior furrow or these very faint in the anterior segments; scobinae strongly impressed, triangular, about as long as wide, 2-3 times their width apart; sternites with about 8 well marked transverse furrows; anal segment shiny with very small weak striae.

Legs short, not reaching the lateral margin when extended sideways; all except the first two pairs with pads, those of the anterior legs reaching to end of tarsus and half the claw, of the posterior legs falling a little short of apex of tarsus; segment V with 1 apical bristle.

Gonopods: Anterior gonopod as in fig. 13 seen from in front, fig. 14 seen in posterior view; posterior gonopod cleft at apex which is divided into two sharply pointed triangular processes.

Dimensions: Total length 39, width 4.4 mm with 42 segments (♀♀ with 43).

Four females from Entabeni near Louis Trichardt (NM. 7734) and one from Louis Trichardt (L. Vari, Nov. 1961) agree well in colouring with the type males. They also agree in being smooth, shiny and with even less well developed sculpturation; anal segment and valves shiny, almost completely smooth, the furrow behind the pore well marked, especially in the posterior segments but not quite reaching the posterior margin of the segment; scobinae strongly impressed, triangular, about three times their width apart.

Dimensions: Total length 38, width 5 mm.

Chersastus rugulosus n.sp. (Figs. 15, 16, 21, 22)

Holotypes, 7 ♂♂, 9 ♀♀ (NM. 264), Hluhluwe Game Reserve, Zululand, collected R. F. Lawrence, Oct. 1935.

♂. *Colour* faded. Head, tergites, anal segment reddish yellow, without markings, tergites in freshly preserved specimens probably with a narrow reddish brown posterior margin merging gradually with the yellow mesozonites, prozonites yellow; antennae and legs yellow.

Head and body: Head smooth, shiny except a broad transverse band behind the eyes which is composed of fairly elongate striae mixed with punctures, vertex furrow deep and distinct ending in a low pit; eyes rounded with about 40 ocelli, those of the posterior row much larger than the others, elongate not round, the eyes a little less than twice their longest diameter apart; collum smooth, shiny, with a few scattered punctures increasing towards the sides, its anterior border very slightly concave, lateral margins a little sinuous. Metazonites of first six segments shiny, a few well separated longitudinal striae and an irregular row of punctures in the middle, mesozonites with close and fine striae mixed with finer punctures than those of the metazonite, this close striation passing progressively further backwards on to the metazonites in the middle and posterior tergites, the difference in sculpture becoming progressively less marked, only the punctures of the metazonites larger and more numerous than in the mesozonites, the whole of the exposed tergite with a matt or satin sheen as in *striolatus*, the striations (at least in posterior half of body), fairly long, close, parallel and longitudinal, not obliquely directed, fig. 21; dividing suture only present in the first five tergites above the pore, in the other segments below the pore; scobinae strong, about twice as wide as long. Anal segment including valves and their inner raised margins closely covered with minute punctures and granuliform sculpture, inner margins of valves thickened and dinstinctly raised; anal scale bluntly rounded posteriorly.

Legs not reaching the lateral margin of body when extended sideways; all with pads except the first two pairs, those of anterior legs exceeding, of the posterior legs reaching, the apex of the tarsus; segment V as in *decoratus*, very short but with 2 bristles.

Gonopods: Anterior gonopod as in fig. 15 seen in anterior view, fig. 16 seen in posterior view.

Dimensions: Total length 49, width 5.4 mm. Number of segments in both sexes 42.

♀. *Colour* as in the male. Head shiny with the band of close striatiform sculpture behind the eyes, finer than in the ♂. Collum lightly sculptured with minute irregular short anastomosing striae and minute punctures, more numerous at the sides and in posterior half, sculpture in general stronger than in the ♂.

Tergites with uniform sculpturation on meso- and metazonites from the second segment backwards consisting of closely packed short longitudinal striae intermixed with punctures; by the middle of the body there is no distinction between the two regions; no transverse suture at all above the pore but well defined below it; the boundary between the meso- and prozonite however, very sharply defined, the latter being quite smooth and shiny or with 1 or 2 very faint encircling lines; the dorsal striae of the tergites stronger in the middle of the body than in the anterior and posterior somites. Anal segment roughened with fine striae, the valves less strongly so, with more creases and punctures than striae; the inner margins of valves quite strongly raised and prominent; posterior margin of anal scale weakly convex, almost straight.

Dimensions: Total length approximately 50, width 7.5 mm.

Additional material: 9 ♂, ♀ (NM. 293), St. Lucia Bay, Zululand, collected W. G. Rump, Nov. 1935; 1 ♀, Gwaliweni Forest, Zululand (NM. 6757), collected R. F. Lawrence, Feb. 1957; 1 ♂ (NM. 9617), Ngoye forest, Zululand collected R. F. Lawrence, Feb. 1953.

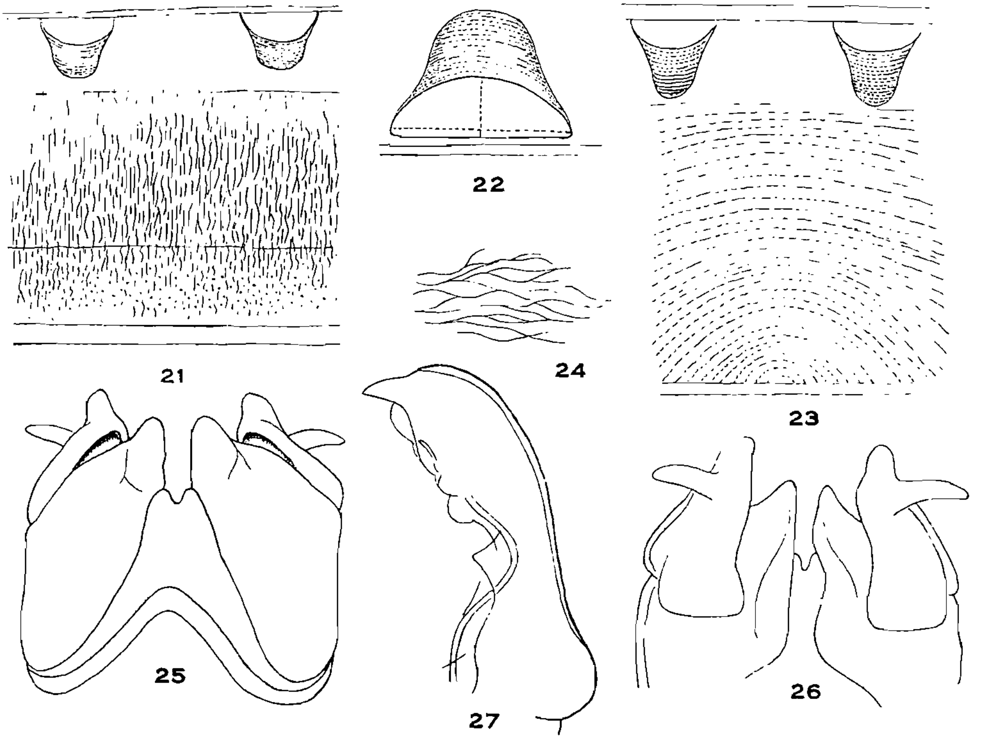
The colouring of the Gwaliweni specimen (NM. 6757) is as follows:— Head, collum and tergites in general reddish yellow to reddish brown, head without markings, collum with a narrow blackish brown margination along its anterior and posterior borders; metazonites with narrow blackish posterior margination becoming reddish by degrees and then reddish yellow (mesozonites), the prozonites yellow, this pattern continuing at the sides; antennae reddish, legs red to dark red (basal segments) the yellow tarsi contrasting; anal segment red as in head and collum, the valves a little deeper red.

This was probably the colouring in the type specimens which have been 31 years in alcohol; in all other respects the Gwaliweni female agrees with the type females.

Another series with similar sculpturation from the Dukuduku forest (NM. 6817) collected R. F. Lawrence, Dec. 1957, has a somewhat different coloration as follows:—Head red but with a darker band behind the eyes, collum darker in posterior half; colour of metazonites similar to those of type but not merging gradually with the prozonites which are yellowish; two rows of yellow dots on each side, one below, one above the pore which is surrounded by a dark marking subequal to the yellow dots. Legs uniformly light reddish, antennae similar. Anterior margin of collum and posterior margins of tergites slightly sinuous. Both sexes with 42 segments.

The ocelli of *rugulosus* are different from those of most species, the posterior row being much larger than the anterior rows and with a different shape.

The species is related to *striolatus* from Port St. Johns in being covered with fine striae but can be readily distinguished from it in the following particulars:



Figs. 21-27. *Chersastus rugulosus* n. sp ♂: 21, sculpture of the 24th tergite, middle of dorsal surface; 22, scobina of same segment, enlarged (the broken lines indicating the axes of measurements). *C. striolatus* Attems ♀: 23, sculpture of the 24th tergite; 24, part of the same enlarged. *Chersastus bifidus* n. sp ♂: 25 and 26, anterior gonopod, oral and aboral views; 27, posterior gonopod.

rugulosus n.sp.

Head and antennae red or yellowish red, collum red or with a narrow dark brown border on anterior and posterior margins. Tergites uniformly red or metazonites with a narrow blackish-brown border posteriorly, passing by degrees into the yellow brown mesozonites and not contrasting with them; metazonites below the pore the same colour as above.

Tergites with stronger and longer striae dorsally, sculpture thus more pronounced.

Striae in middle of dorsal surface of tergites straight, parallel to longitudinal axis of body (fig. 21).

striolatus Attems

Head and antennae blackish, collum with a broad black band on posterior margin. Metazonites black as far as the pore, below it dull red, the two colours sharply contrasting; mesozonites yellow dorsally, contrasting with the black metazonites.

Tergites with weaker, shorter striae, sculpture less pronounced.

Striae in middle of dorsal surface of tergites concentrically arranged in a curved series (fig. 23).

Chersastus richardi n.sp. (Figs. 17-20)

Holotype, 1 ♂, paratypes 2 ♂♂ (NM. 8129), Richards Bay, Zululand, collected R. F. Lawrence, Dec. 1960.

Colour: Head, collum, antennae and legs blood red, anal segment lighter red; metazonites blood red, contrasting sharply with the black mesozonites at the sides, rather less so dorsally, prozonites light brown to yellow on their anterior margins.

Head and body: Labral sinus shallow, frons with a few faint irregular transverse creases and striae, no vertex furrow, head otherwise smooth; eyes with 48 equal ocelli, $1\frac{3}{8}$ their greatest width apart; collum with fine short tesselated striae taking the shine from the segment which is nevertheless smooth; metazonites shiny and smooth except for some faint indications of a few obsolete longitudinal striae, distinctly raised above the rest of the tergite and convex in profile, not flat; the suture clearly defined, prozonite just anterior to the suture with a few irregular sinuous encircling furrows, the covered portion smooth or with very faint short striae; scobinae practically non-existent, very weak and minute; pores with the posterior furrow very fine but present, reaching to posterior end of segment. Anal segment smooth, shiny the valves similar, their inner margins slightly thickened but not raised at all from surface of valve; anal scale semicircular, its posterior margin evenly rounded.

Legs long and slender, when extended laterally reaching beyond the sides of the tergite; the first two and last 20-22 pairs without pads; even in the anterior legs the pads not reaching the apex of the tarsus, fig. 19, occupying only the basal two-thirds of the segment in the middle tergites, by the 54th leg only the basal half or less, fig. 20; segment V not greatly abbreviated, its width equal to its length measured dorsally, with 1 strong bristle.

Gonopods: Anterior gonopod as in fig. 17 seen from in front, fig. 18 seen in posterior view.

Dimensions: Total length 59, width 5.2 mm. Number of segments 43.

Additional material: 1 ♂, 1 ♀, St. Lucia Bay, Zululand (NM. 9616), collected A. C. van Bruggen, Dec. 1962; the female differs neither in colouring nor in sculpturation from the ♂ type, the legs fairly long and slender; total length about 50 mm, width 5.5 mm, number of segments 43. 2 ♂♂ (NM. 4032), Richards Bay, collected R. F. Lawrence, Dec. 1943. 1♂, 7♀♀, Lake Sibayi collected R. F. Lawrence and B. Lamoral, June 1967.

Chersastus bifidus n.sp. (Figs. 25-27)

Holotype, 1 ♂, paratype 1 ♂ (NM. 4040), Nkandhla forest, Zululand, collected R. F. Lawrence, Dec. 1943.

Colour: Head and antennae blackish brown, collum and tergites reddish, the latter with narrow transverse blackish bands, the former with slightly darker red but ill-defined anterior and posterior marginal bands; metazonites dark reddish black, becoming gradually orange towards the suture, a narrow orange posterior margination; whole of mesozonite light pink, prozonites yellow; anal segment orange, the valves a little lighter; legs entirely yellow with orange tinge, the basal segment a little darker.

Head and body: Clypeus weakly shagreened with microscopic punctures and minute striae, a short clypeal but no vertex furrow in the middle; eyes with 42 ocelli, 1½ times their longest diameter apart. Collum faintly shagreened and with fairly numerous minute punctures. Tergites with posterior margins of metazonites smooth, shiny, between this and the suture a transverse band of distinct punctures; mesozonite without distinct encircling lines but with numerous very faint short longitudinal striae (also present on posterior third of metazonite), prozonites smooth; scobinae very small and weak, much wider than long, 2-3 times their width apart. Anal valves smooth but not entirely shiny, inner margins without thickenings, not raised at all above the surface; anal scale in the middle with a blunt posterior angle of 90°.

Legs: All the legs padded, the pads large and thick, just reaching the apex of tarsus in posterior legs, but to a third of the claw in anterior legs. Segment V in anterior legs short, considerably deeper than dorsally long, with two apical spines.

Gonopods: Sternum of anterior gonopod bluntly bifid, fig. 25; apex of distal segment not demarcated as a globular or rounded enlargement as in most other species but the lateral horn-like process just below it unusually long, figs. 25, 26, seen in anterior and posterior views respectively. Posterior gonopod as in fig. 27.

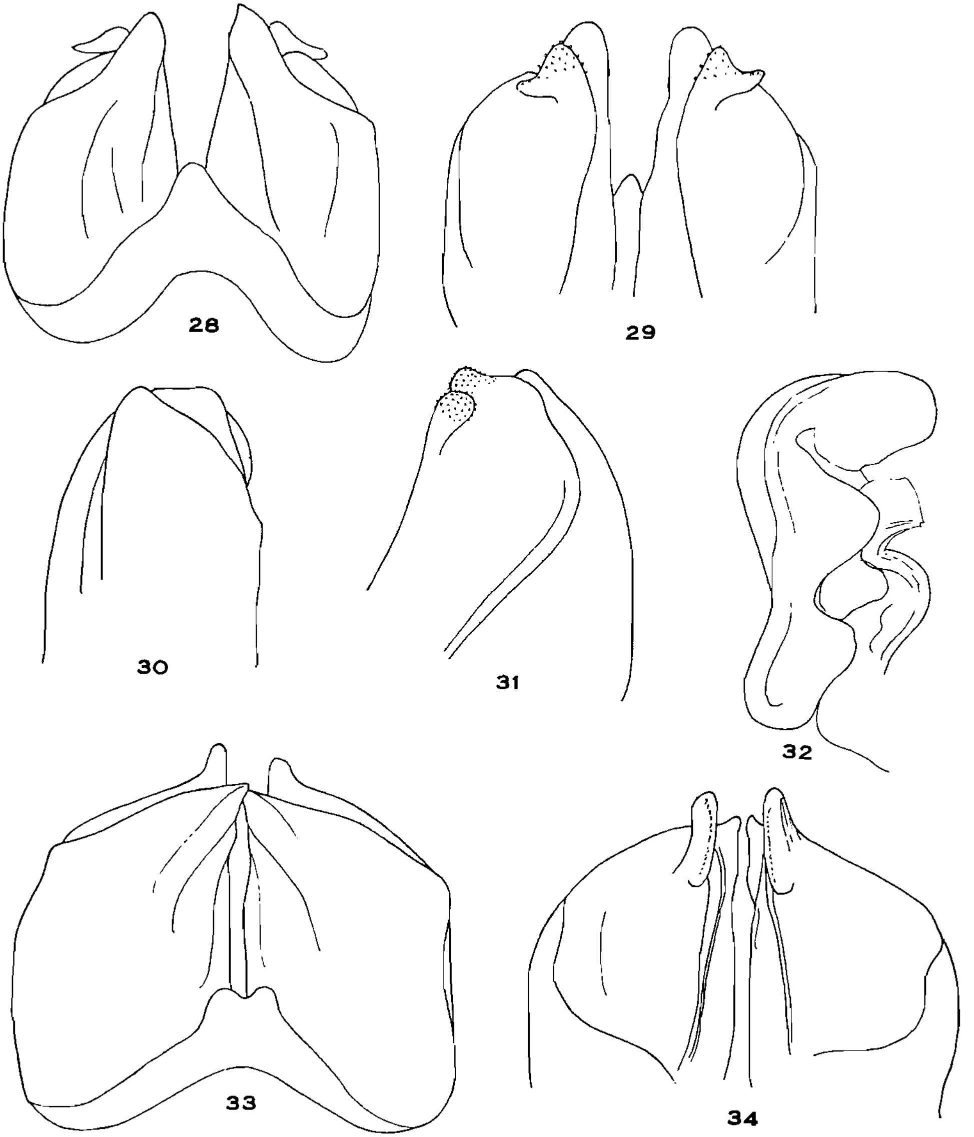
Dimensions: Total length 36, width 3.9 mm; number of segments 42.

Additional material: 1 ♂ (NM. 1001) with the same data as the holotype, collected January 1937. The species is distinctive in having the head and antennae blackish, the legs yellow; in the key it would probably come closest to *lawrencei* Schubart. The light brown or orange band on the posterior margins of the metazonites is present in the following species as well as *bifidus: tricolor, angelicus, lawrencei, rubricollis, striolatus* and *inscriptus;* none of the remaining species dealt with in this paper have it, or if present it is so narrow as to be virtually invisible. The brightly coloured, more decorative species thus tend to be without this band.

Chersastus albitarsis n.sp. (Figs. 28, 29)

Holotype, 1 ♂, 1 ♀, paratypes 3 ♂♂ (NM. 2298), Lochiel, Transvaal, collected R. F. Lawrence, Jan. 1939.

♂. *Colour:* Head and antennae black, collum and tergites red, anal segment light red, valves yellow to orange, legs mottled black except the light yellow tarsi which contrast with the remaining segments; metazonites and mesozonites dorsally red, the latter with a rounded black dot in the middle, the pores and mesozonites below them, black, prozonites



Figs. 28-34. *Chersastus albitarsis*. sp ♂: 28 and 29, anterior gonopods, oral and aboral views; 30 and 31, the same of *C. sanguinipes* n. sp ♂; 32, posterior gonopod. *C. lugubris* n. sp ♂: 33 and 34, anterior gonopods, oral and aboral views.

yellow; the general effect a reddish background with 3 longitudinal black stripes; the first 4 tergites behind the collum not darkened at the sides, entirely red except for a black dot in the middle, minute on tergite I becoming progressively larger in the posterior ones. In at least one of the paratype males, the mesozonite is blackened dorsally to the pore though not as strongly as below it, giving a banded effect in black and red.

Head and body: Head smooth and shiny, without furrows or sculpture; eyes with 33 ocelli, 2½-3 times their greatest width apart. Collum and tergites smooth and shiny but with numerous microscopic striae and punctures; transverse suture very fine but clearly defined, pore without a short posterior furrow or only in some of the posterior tergites; encircling lines of prozonite obsolete, represented by a few broken, wavy, transverse striae, in the posterior segments some well-defined oblique striae above the pore but not in the middle; scobinae well-defined, 2-3 times as long as wide, their width apart; posterior margins of metazonites slightly indented opposite the scobinae of the preceding segment.

Legs short, not reaching the lateral margin of the tergite when extended, all except first 2 pairs with short pads, well rounded at the distal apices, pads extending to middle of claw in anterior legs, falling a little short of apex of tarsus in the posterior ones; segment V about as long as wide, with 2 apical bristles.

Gonopods: Anterior gonopod as in fig. 28 seen in anterior view, fig. 29 posterior view.

Dimensions: Total length 39, width 4 mm. Both sexes with 42 segments.

♀. *Colour* as in the ♂ but the transverse banding of the tergites more pronounced, only the dorso-median row of black dots persisting, represented by a slight prolongation backwards in the middle of the black transverse band of the mesozonite. The microscopic striae and punctures of the tergites more numerous, the sculpture a little stronger, the furrow posterior to each pore distinct, reaching the end of the segment; scobinae 1½-2 their width apart; inner margins of anal valves a little raised and thickened; legs proportionately longer.

Dimensions: Total length 50, width 6 mm.

Chersastus validus n.sp.

Holotype, 1 ♀ (NM. 9397), Haroni River, Rhodesia, collected M. Graham, Dec. 1965. Climbing on trees in *Podocarpus* forest at 1,300 ft. altitude.

Colour: Trunk blackish brown, the head and anterior segments with reddish tinge, antennae orange, legs yellow.

Head and body: Labral sinus with a fairly sharp obtuse angle, clypeus as far as antennae with irregular wavy transverse creases and furrows, remainder of head almost smooth except for a band of microscopic punctures along its posterior border, a short vertex furrow from posterior margin to the middle of the eye level; eyes with about 50 ocelli, a little more than twice their greatest width apart; collum shiny, smooth, with a background of minute leather-like creases, a strong deep but short transverse groove in the middle of segment, anterior border with a fine marginal groove passing beyond the eye inwards, posterior border with a strong marginal impression. In general both metazonites and mesozonites with large coarse furrow-like grooves transversely, obscuring the suture, the first three segments, however, without grooves on the metazonites (2-3 on the mesozonites, these recurved on each side of the segment); in the posterior segments the metazonal grooves are either absent or much less conspicuous than those of the mesozonites; prozonites quite smooth; the grooves of the tergites (usually 1 on the meta-, 2-3 on the mesozonite) fairly widely separated, the areas between them quite smooth and shiny, metazonites below the pore with oblique and some straight longitudinal furrows as well;

pores without a posterior furrow; scobinae small, not strongly impressed, about twice as wide as long, separated by 2-3 times their own width; sternites with 8-9 strong, almost straight transverse furrows. Anal segment above near its posterior margin with 2 deep but incomplete and broken transverse grooves, produced and bluntly pointed in the middle; valves smooth, inner margins thickened and well raised, separated from rest of surface by a shallow depression containing some short oblique furrows; posterior margin of anal scale obtusely angular.

Legs long and slender, surpassing the sides of the tergite when extended laterally. Segment V much longer than wide, with 1 apical bristle.

Dimensions: Total length 70, width 8 mm. Number of segments 39.

The species is unusually large and robust for membership of the genus *Chersastus*; it may possibly be a species of *Metiche* with which it is comparable in size although this genus does not seem to have scobinae. Although based on a female only, this species with its characteristic colouring and sculpture, should be easy to recognise. It was found climbing a tree 4 feet from the ground.

Chersastus sanguinipes n.sp. (Fig. 30-32)

Holotype, 1 ♂ (NM. 8247), Qolora river mouth, Transkei, collected R. F. Lawrence, Jan. 1962.

Colour very unusual and striking; the whole body a deep purplish black, the following parts bright scarlet and contrasting vividly with the remainder of the animal; head, antennae, anal segment and legs, the latter the brightest of these; valves a little lighter than the rest of the anal segment; covered prozonites white to yellowish.

Head and body: Head smooth and shiny, without furrows except a short, very faint vertex furrow between the eyes; eye with 50 ocelli, twice their greatest width apart; collum entirely smooth and shiny with a fine anterior marginal furrow as far as middle of eye; tergites very smooth and shiny, the suture fine but distinct, in front of it some faint and broken encircling lines in 2 or 3 irregular rows; pores with a very faint posterior furrow reaching the hind margin of metazonite; scobinae distinct, 3 times as wide as long, separated by less than their width; anal segment and valves with microscopic punctures, the valves slightly thickened, only a little raised above the surface, scale with its posterior margin obtusely angular in the middle.

Legs: All except the first 2 and last 14 pairs with pads, just reaching the apex of tarsus in the anterior legs, falling a little short of it in the posterior two-thirds of the body. Legs long, when extended reaching beyond the lateral margin of the tergite. Segment V not abbreviated, a little longer dorsally than deep, with 2 strong apical bristles.

Gonopods: Distal half of anterior gonopod as in fig. 30 seen in anterior view, fig. 31 posterior view; posterior gonopod as in fig. 32.

Dimensions: Total length 56, width 5 mm, number of segments 44.

The species differs completely in its colouring from all other forms of *Chersastus* known to me from the eastern half of Southern Africa.

Chersastus lugubris n.sp. (Figs. 33, 34)

Holotypes, 1 ♂, 1 ♀ (NM. 9024), paratype 1 ♂ Glenconnor, East Cape (about 100 miles NW of Port Elizabeth), collected under fallen and decaying *Euphorbia* stems, March 1964.

♂. *Colour* in general very dark, almost black; head black, margin of clypeus lighter, antennae dark red, collum black with a pair of indistinct oval dark red markings in the middle near anterior margin (in the other ♂ an M-shaped reddish marking occupying the middle third of segment); anal segment entirely black or with very slight reddish tinge; legs reddish brown. Tergites black with a pair of paramedian red stripes composed of a quadrilateral marking on each mesozonite and thus not reaching posterior margin of the tergites, considerably wider than long; in the posterior tergites occupying the metazonite as well and as long as wide or longer.

Head: Labral sinus with obtuse angle, whole of head quite smooth and shiny except for a very short deep vertex sulcus in the middle of its posterior margin; eyes with about 33 ocelli, three times or more their width apart; collum smooth, shiny, its antero-lateral margin very slightly sinuous, with a short submarginal furrow.

Tergites smooth, shiny, but the gloss reduced by innumerable rather faint minute striae and punctures on the meta- and mesozonites, the prozonites quite smooth; no scobinae; suture absent even below the pores, indicated by a faint groove; sternites with about 11 very distinct transverse grooves, not all of them complete; anal valves smooth with an irregular row of punctures near their posterior margins, inner marginal thickenings completely absent, inner edge not raised at all above the surface of valve but gently rounded; anal scale with posterior margin rounded.

Legs fairly long, surpassing a little the lateral margin of the tergites when extended, all with pads, these passing well beyond the apex of the tarsus, segment V with 2 bristles, segments IV and VI subequal, III a little longer.

Gonopods: Anterior gonopod as in fig. 33 seen in anterior view, fig. 34 posterior view; sternum unusually wide and short.

Dimensions: Width 6.2, length 53mm; number of segments 45.

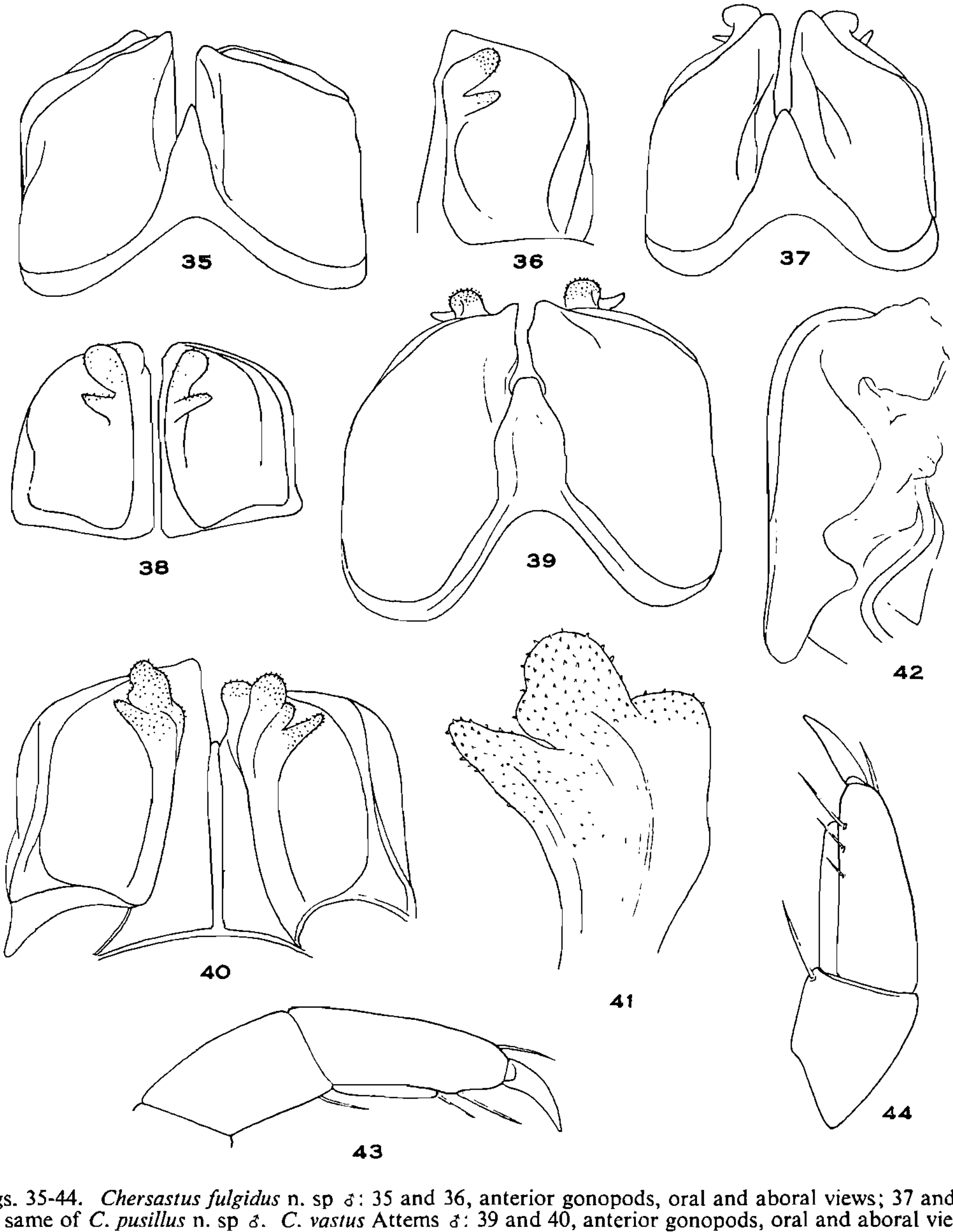
♀. Colour as in the ♂, collum however entirely black. General surface of tergites dull not shiny (except prozonites) due to an extremely close shagreen of minute striae and microscopic punctures. Frons of head anterior to base of antennae with coarse transverse irregular grooves, a few irregular scratches between the eyes which are almost 4 times their diameter apart and have less than 30 ocelli; anal valves with inner margins distinctly thickened and raised fairly high above the valve surface, separated by a very low depression, sides of thickenings with numerous faint punctures. Sternites with few and less regular but even stronger transverse grooves.

The female in general much larger and stouter, with much weaker and shorter legs, a little more than half as long as those of the male.

Dimensions: Width 8.4, length 63 mm, number of segments 46. The species resembles *coriaceus*, *erythroproctus*, *formosus* and *litoralis* (= *tesselatus*) but differs from all in its much darker colouring and from each in one or another character; it resembles *formosus* in having a pair of red spots on the collum, *tesselatus* in the small number of ocelli, *erythroproctus* in having all the legs of the male padded.

Chersastus fulgidus n.sp. (Figs. 35, 36)

Holotypes, 1 ♂, 1 ♀, paratypes 4 ♂♂ (NM. 9630), Richards Bay, Zululand, collected R. F. Lawrence, Dec. 1943.



Figs. 35-44. *Chersastus fulgidus* n. sp ♂: 35 and 36, anterior gonopods, oral and aboral views; 37 and 38 the same of *C. pusillus* n. sp ♂. *C. vastus* Attems ♂: 39 and 40, anterior gonopods, oral and aboral views; 41, apex of distal segment enlarged; 42, posterior gonopod. *C. anulatus* Attems ♂: 43, segments V and VI of 53rd leg: 44, the same of ninth leg.

♂. *Colour:* Head, antennae, legs and anal segment yellow to orange, frons with a pair of ill-defined curved, dark markings between the eyes; collum reddish orange, a wide transverse dark reddish brown band in the middle, nearer the posterior than the anterior margin; tergites with a jet black, sharply defined rather narrow transverse band occupying the whole of the metazonite and contrasting strongly with the rest of the segment (mesozonite orange, prozonite yellow); the extreme posterior edge of metazonites with a narrow light margination; the black bands present in all segments but in some incomplete, with 2 dorsal paramedian constrictions or complete breaks so that they have a dorsal transversely oval black marking in the middle of the back flanked by black bands passing all the way to the ventral surface.

Head: Labral sinus obtusely angular, frons quite smooth and very shiny, a faint clypeal median suture disappearing between the antennae, a deep furrow on the posterior margin ending in a pit between the eyes; eyes with about 50 ocelli, twice their longest diameter apart.

Tergites: Collum bluntly angled laterally, quite smooth and shiny; all tergites very smooth, with mirror-like reflective surface, metazonites with no sculpture, mesozonites with 5-6 rows of well separated encircling lines, these wavy, very irregular and much broken, prozonites quite smooth; scobinae distinct in anterior segments, large, separated by their width; suture quite obliterated, no fine furrow behind the pores which are very large and distinct. Anal segment smooth, not quite as shiny as the tergites, the inner margins not much thickened but very distinct, raised high above the valve surface from which it is separated by a low but distinct depression; anal scale distinctly but obtusely angular.

Legs long, passing well beyond the lateral margins of the tergites when extended, all except the last 14 pairs with pads, these not passing beyond the apex of tarsus; segment V with a single bristle.

Gonopods: Anterior gonopod as in fig. 35 seen from in front, fig. 36 seen from behind.

Dimensions: Width 5.2, total length 54 mm; number of segments 43.

♀. Colour similar to that of the ♂, but the dark markings less clearly defined, that between the eyes very faint; transverse black bands only complete in about the first 10 and last 12 tergites, even in these separated by a gap on each side from the median black dorsal marking which persists throughout all the segments.

Head smooth, shiny, frons with faint reticulate furrows but the posterior vertex furrow weaker than in the ♂. Tergites with the sculpture entirely similar to the ♂, the tergites with mirror-like reflecting surface, the encircling lines more regular, more numerous and closer together than in the ♂. Inner margins of valves slightly thickened, raised only a little above the surface. Legs weaker and shorter than in the ♂, just falling short of the lateral margin of the tergites when extended sideways.

Dimensions: Width 6.8, length 52 mm; 44 segments.

Additional material: 2 ♂♂ (NM. 5040), Ngoye forest, Zululand, collected R. F. Lawrence, Feb. 1953, one of these specimens 63 mm in length; 3 ♂♂, 1 ♀ (NM. 263), Hluhluwe Game Reserve, Zululand, collected R. F. Lawrence, October 1953; 1 ♂, 2 ♀♀ (NM. 9618), St. Lucia Bay, Zululand, collected W. G. Rump, November 1935; 2 ♂♂, 2 ♀♀ (NM. 6223), Kranskop, Natal, collected R. F. Lawrence, Nov. 1954.

The species differs from *richardi*, which occurs in the same locality, in the colour of the metazonites, the far more reflective surface of the tergites, the presence of scobinae, the tarsal pads occupying the whole of the segment in the posterior tarsi of the males instead of only the half or two-thirds.

Chersastus pusillus n.sp. (Figs. 37, 38)

A small dark species with only 38 segments.

Holotypes: 1 ♂, 1 ♀, paratypes 3 ♂♂, 1 ♀ (NM. 8243), Qolora river mouth, Transkei, collected R. F. Lawrence, Jan. 1962.

♂. *Colour:* Head, antennae and legs black to blackish-brown, anal segment blackish but the valves red; collum black, anterior half red; tergites black but mesozonites with a pair of dorso-median, indistinctly quadratiform red markings becoming progressively less well defined posteriorly.

Head and collum: Frons very shiny and smooth, a very faint short clypeal and vertex furrow; eyes with 46-50 ocelli, twice or a little less their diameter apart; collum smooth, shiny, only the anterior half with microscopic well separated punctures.

Tergites: Suture completely obliterated above but distinct below the pore; metazonites glossy, shiny, just behind the vestigial suture dorsally with a band or irregularly duplicated row of minute punctures, these becoming much larger and more distinct below the pore; pores large, touching the suture, with a posterior furrow (only in the posterior segments) which does not reach the hind margin; prozonites with very faint, hardly perceptible irregular concentric lines; scobinae small but distinct, twice as wide as long, 2-3 times their width apart; sternites with 7-8 deep distinct transverse furrows; anal segment and valves smooth, inner margins of the latter fairly distinct but not well raised above the surface, a few short creases in the depression.

Legs not long, slightly exceeding the lateral margin of the tergites when extended, segment V with 1 long bristle, all except the last 10 pairs padded, the pads not decreasing in length posteriorly and not surpassing the apex of the tarsus.

Gonopods: Anterior gonopod as in figs. 37 and 38, seen in anterior and posterior view respectively.

Dimensions: Width 4, total length 39 mm, number of segments 38.

♀ Colour as in the ♂ but the markings more distinct. Head shiny, frons with faint reticulating furrows; posterior margin behind the eyes shagreened with minute punctures and striae; eyes with about 50 ocelli; collum as in ♂; suture faint dorsally though visible in the anterior segments; metazonites similar to those of the ♂ but in the posterior segments these also with some extremely minute punctures, their surfaces thus not as shiny; encircling lines of mesozonites closer together, more regular and stronger, prozonite in its posterior half with still finer lines, in anterior half smooth. Anal segment as in the ♂, the surface of valves with a few scattered punctures. Legs relatively only a little shorter than in ♂, falling well short of the sides of the tergites.

Dimensions: Width 5.7, total length 40 mm, number of segments 38.

In Schubart's and Jeekel's keys, this species would come nearest to *strigosus* Porat in coloration but is obviously different in its sculpture and much smaller size.

Notes and supplementary descriptions of known species

Chersastus vastus Attems (Figs. 39-42, 46)

C. vastus Attems 1934, Ann. Natal Mus. 7 (3): 477-478, text-fig. 4, Pl. XXV, figs. 50, 51.

Topotypes, 4 ♂♂, 1 ♀, Port St. Johns (NM. 4491), collected July 1945, R. F. Lawrence.
♂. *Colour:* Body in general with black markings on a bright red background, head, antennae, legs, anal segment, bright red; collum red with a broad transverse black band in the middle, the remainder red, the anterior red margination equal to it in width, the posterior red portion a little narrower. Body above with a black median longitudinal stripe composed of a subtriangular black spot on each somite and a black stripe on each side passing through the pores; in addition six transverse black annulations in posterior half of the body, each occupying two segments (the whole metazonite and mesozonite), the bands not reaching far below the pore laterally, an interval of 4 somites between each of the bands which occur on the following segments: 17.18/22.23/27.28/32.33/37.38/41.42 (fig. 46). These bands very conspicuous in the living millipede but sometimes much less so in Museum spirit specimens.
Head: Four labral teeth, 4 very distinct supra-labral pits, clypeus quite smooth, shiny, without median, or vertex furrows, about 48 ocelli, the eyes 1½ times their greatest width apart; collum laterally bluntly triangular, a weak marginal furrow only on anterior margin as far as the eye.
Collum and tergites: Shiny and polished, only the prozonites with very fine faint rather irregular encircling furrows; sternites with 7-8 distinct transverse furrows. Scobinae absent. Valves of anal segment well raised with a shallow depression laterally, their general surfaces quite smooth, moderately convex.
Legs long, reaching well beyond the lateral margins of tergites when extended laterally; all padded except the first two and last fourteen pairs, the tarsal pad falling a little short of tarsal apex, but not decreasing much in length in posterior legs; segment V with 1 apical bristle.
Gonopods: Anterior gonopod as in fig. 39, oral view, the sternum subangular and pentagonal, aboral view as in fig. 40, the distal segment of the gonopod ending in two lobes, the one rounded, the other bluntly tooth shaped, both covered with numerous short spicules, fig. 41 (only the rounded lobe shown to be with spicules in Attems fig. 51, 1934); posterior gonopod as in fig. 42, differing in detail from Attems fig. 50.
Dimensions: Total length approximately 65, greatest width 6 mm. With 43 segments but 44 or 45 in the other three males.
♀. Much more robust though not longer; approximate length 63, greatest width 8.2 mm. Number of segments 44.
Additional material: 2 ♂♂, 2 ♀♀ (NM. 8954), Trafalgar, near Ramsgate; 2 ♂♂, Port Edward (NM. 4020); Ifafa (Attems); Mngazi river mouth, a few miles S.W.W. of Port St. Johns (NM. 6230); 2 ♂♂, 2 ♀♀ (NM. 1630), Port St. Johns; 5 ♂ ♀ (NM. 2697, 6223), Kranskop, Natal; 31 ♂ ♀ (NM. 2241), Ingwavuma, Zululand; 1 ♂ 2 ♀♀ (N.M. 9613), Gwaliweni, Zululand.
Remarks: Attems did not designate the holotype which is perhaps still in the Naturhistorisches Museum in Vienna. Of the material returned to the Natal Museum I have

only been able to find a rather damaged female from Port St. Johns which was mounted and placed in the exhibited collections. In his brief description Attems does not mention the black transverse bands so conspicuous in the posterior half of the body but they are present in all our numerous specimens from Port St. Johns which is presumably the type locality of the species and which are faintly visible in the above mentioned mounted female. In all these specimens the black spots take up a larger proportion of the tergites than in the Natal ones from Trafalgar and Port Edward so that in the former the colour appears to be red on a black background while in the latter the reverse is the case and red is much the more predominating colour.

North of Ifafa specimens of *vastus* have only the three rows of black spots, the six transverse bands of the posterior half of the body being absent; these I regard as the typical form of *vastus*; specimens from Ramsgate to Port St. Johns with these bands evidently represent a distinct colour variety to which I here give the name of *vastus sexfasciatus* (fig. 46); north of Durban specimens of *vastus* progressively assume the colour pattern of *inscriptus*; the two species are then very similar and it becomes difficult to tell which species is indicated by the descriptions of Attems.

The subspecies *sexfasciatus* has a limited distribution in the coastal bush of the litoral from Margate (Natal) to just beyond Port St. Johns (Transkei) and has not been recorded from inland localities. The six banded form does not seem to occur at Ifafa and the specimen identified by Attems from this locality should be regarded as typical *vastus*.

It is an active climber of shrubs and small trees where it is usually found, often at considerable heights above ground; in this respect it is unlike *C. inscriptus* Attems with which it occurs at Trafalgar, a species usually found covered in leafy humus.

In life the background colour is a brilliant red, resembling fresh sealing wax, and with the black decorative patterns is an extremely striking and handsome species.

Chersastus lawrencei Schubart

C. lawrencei Schubart 1966, Diplopoda III, S. Afr. Anim. Life, **12,** p. 53, figs. 44-49.

The author gives no opinion as to the nearest relationships of the species which seem to lie with *inscriptus* Attems and *rubricollis*, especially the latter. It agrees with *rubricollis* in the general colouring and the sculpture of the tergites, differing in having only the last six legs without pads (15 in *rubricollis*); the difference in the structure of the anterior gonopod is remarkable, the sternum also being quite differently shaped (compare figs. 42, 43 of this paper with Schubart's 46, 47).

The Museum has numerous specimens of both sexes from the type locality, Town Bush, Pietermaritzburg, alt. 3,400′ (NM.2687,4410,9381), and Richmond (NM.4481,7832).

Chersastus rubricollis Schubart (Figs. 49, 50)

C. rubricollis Schubart 1966, Diplopoda III, S. Afr. Anim. Life, **12,** p. 43.

I took this species to be merely a colour variety of *C. lawrencei* but examination of the gonopods of the males from the type locality reveal very considerable differences from those figured by Schubart (see above) and also from those of fresh material from the type locality of *lawrencei* which I have examined. The species was based upon a ♀; the following is a description of a ♂ (NM. 4055) from Karkloof, the type locality.

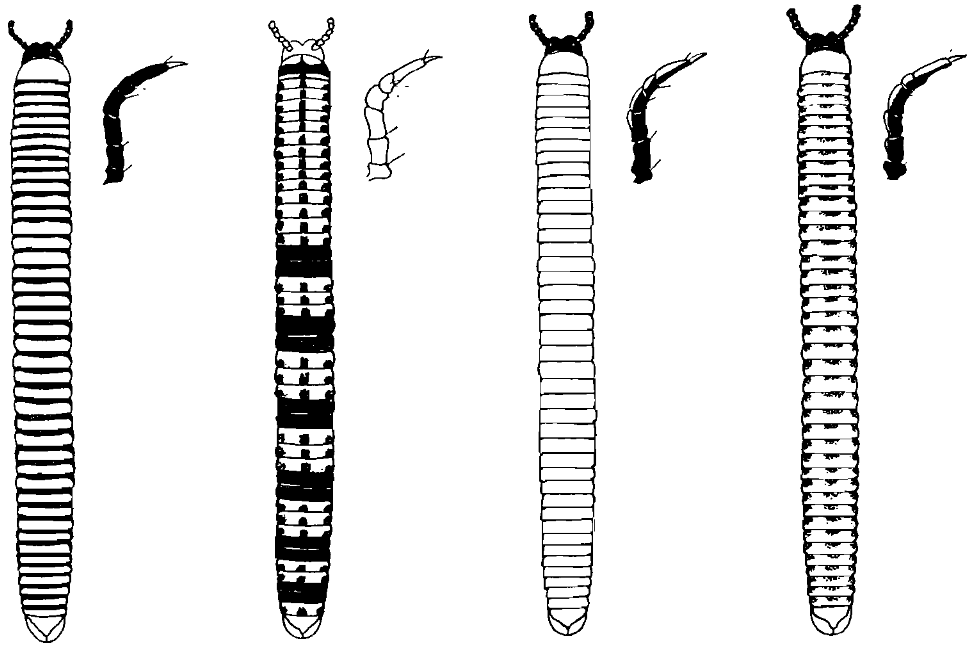
♂. Colour as in the description of the ♀; the sculpture of the head, collum and body tergites agree in general with that of the ♀ except that in all cases it is much less strongly developed; a large part of the posterior margins of all the tergites are quite smooth and shiny, the general surface becoming progressively more sculptured in the posterior segments but never strongly so. Thickening of the inner margins of the anal valves is present but slight, hardly raised at all above the valve surface, the separation indicated by a very weak groove. Scobinae distinct though small, about twice as wide as long, their own width apart.

Legs fairly long, surpassing by a little the lateral margins of the tergites when extended; segment V with 2 bristles; all legs except the last 15 pairs with pads, these occupying the whole length of the tarsus.

Anterior gonopods as in fig. 45 seen in anterior, fig. 46 in posterior view, the sternal process unusually long and narrow distally.

Dimensions: Width 5, total length 49 mm, 43 segments.

Material: 2 ♂♂ (NM. 4055), from Karkloof, the type locality 35 miles NE of Pietermaritzburg; 1 ♂ (NM. 6290), Nottingham Road; 6 ♂♂ (NM. 7097, 9287), Deepdale, Umkomaas river valley between Bulwer and Pietermaritzburg.



45 46 47 48

Figs. 45-48. Black colour patterns on a reddish background of, 45 *Chersastus anulatus* Attems; 46, *Chersastus vastus* Attems; 47, *Chersastus ruber* Attems; 48, *Chersastus vulpinus* Attems (partly schematic).

Chersastus anulatus Attems (Figs. 43-45)

C. anulatus Attems 1934, Ann. Natal Mus. 7 (3); p. 478, fig. 5.

The species was very briefly described by Attems on the basis of a ♂ and ♀ from Ifafa, south coast, Natal; the five lines of description given by the author seem to have been devoted to the male sex only, although measurements of the female are given. The only figure (*loc. cit.* text—fig. 5) is the reproduction in black and white of an original which was executed in the natural colours of the millipede. The gonopods are described as "like those of *C. vastus*".

The Natal Museum has a ♀ which I regard as a cotype (NM. 8127) from Ifafa, which had been mounted on glass with gelatine and placed in the exhibited collections. The eyes of this specimen have about 57 ocelli and are a little less than twice their diameter apart; segment V of the legs with 1 bristle. In males and females from Kelso Station, a few miles from the type locality, the legs are long, exceeding the lateral margins of the tergites when extended laterally and increasing progressively in length backwards (more so in the female). The tarsal pads very inconspicuous, absent on the last 16-18 pairs of legs, the pads themselves abbreviated, occupying three-fourths length of tarsus in anterior, half or two-thirds in posterior segments, figs. 43, 44. No scobinae; the metazonites of the females smooth, shiny and without sculpturation as in the males; in some specimens there are 1 or 2 very deep, coarse, transverse grooves on the mesozonites, especially in the posterior segments, resembling those of *validus* n.sp. from Rhodesia.

I do not think that Schubart's *C. rubrofasciatus* from the Bluff, Durban, is different from this species. Schubart, who mentions that his material was old and in poor condition, was probably in some doubt owing to Attems' inadequate description.

Additional material: 3 ♂♂ (NM. 9382), Kelso Station, Natal; 1 ♂ (NM. 8888), Mtunzini, Zululand; 1 ♀ (NM. 8967), the Bluff, Durban; 2 ♂♂ (NM. 9619), Berman Bush, Durban (O. Bourquin); 1 ♀ Scottburgh, South Coast (A. W. Cullingworth, Dec. 1962); 1 ♂♀ (NM. 9625), Ifafa lagoon; 1 ♂, 1 ♀ (NM. 9627), Umhlanga rocks, 8 miles N. of the Umgeni river, in coastal bush.

Chersastus ruber, Attems (Fig. 47)

C. ruber Attems 1928, Ann. S. Afr. Mus. 26, p. 304, Pl .IX figs. 221-223.

The ♂ and ♀ types were described from Umzimkulu and the Kentani district, the former being presumably the type locality. It was later recorded by Attems from Ifafa.

This species, like nearly all the coastal forms, is brightly coloured and it seems unlikely that the type came from Umzimkulu itself, a small village about 50 miles inland, but rather from the mouth of the Umzimkulu river which enterers the sea at Port Shepstone; if this is so, Port Shepstone would more accurately represent the type locality and specimens from there agree in all details with Attems' description*. Another female identified as this species by Attems is from Scottburgh.

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* Dr. A. J. Hesse of the South African Museum, Cape Town, tells me that the catalogue number quoted by Attems at the conclusion of his description should be A. 2381 not A. 23381 and the type locality "Marble Quarry, Umzimkulu river". The quarry is near the mouth of the river at Port Shepstone.

The eyes of the specimens from Ifafa have about 50 ocelli, and are a little less than twice their diameter apart. Legs of the long slender type, well surpassing the lateral margin of tergite when extended; segment V with 1 bristle, pads absent from the last 20 pairs of legs, not occupying the whole of the tarsus in anterior legs and about three-fourths in the posterior ones. The specimens from the Ngoye forest are not typical, the head, antennae and legs being considerably lighter in colour, the body in posterior half with darkish prozonites which contrast somewhat with the metazonites (banding effect), the anterior tergites uniformly red in colour. This form appears to be intermediate to *ruber* and *anulatus* but when better material has been procured may justify specific or subspecific separation.
Additional material: 1 ♂, 1 ♀ (NM. 5041), Ngoye forest, Zululand; 4 ♂♂ (NM. 4022), Port Shepstone; 2 ♂♂, ♀ (NM. 969), Beach Terminus, near Port Shepstone; 1 ♀ (NM. 1634), Port Shepstone; 3 ♂♂ from Ifafa identified as this species, were mounted on glass in the exhibited collections (Museum No. 1447) collected C. Akerman.

Chersastus striolatus Attems (Figs. 23, 24)

C. striolatus Attems 1934, Ann. Natal Mus. **7** (3), p. 479.

What is presumably Attems' type, a female specimen from Port St. Johns, was mounted on a glass sheet with gelatine and placed in the exhibition cases of the Natal Museum. It agrees well in colour and sculpture with Attems' description. It may be noted that although much collecting has been carried out at Port St. Johns by Museum staff members and much *Chersastus* material acquired, no males or further females of this species have been obtained from this locality. The female of the montane species *tricolor* n.sp. has a sculpture which is completely different from the male (as in *silvanus* Attems but not in *rugulosus* n.sp.) consisting of fine close striae as in *striolatus* so that males of the last named species from Port St. Johns, when eventually found, may also prove to lack the sculpture of the female.

Chersastus inscriptus Attems

C. inscriptus Attems 1928, Ann. S. Afr. Mus. **26**, p. 307, figs. 231-235.
C. inscriptus Attems 1934, Ann. Natal Mus. **7** (3). p. 477, Pl. XXV, fig. 49.

The type, a male, was described from Scottburgh, South Coast, Natal.

This appears to be one of the few species of *Chersastus* which is both common and has a fairly extensive distribution. This may be due to the fact that it is usually found buried in forest humus; it is not a brightly coloured species but often shares the same localities with those which are, such as *vastus* and *anulatus*, forms which are much less cryptic in habit and which are usually encountered climbing shrubs and small trees where their brilliant red warning colouration makes them extremely conspicuous and attractive objects.

The Natal Museum has the species from the following localities: 5 ♂♂, Mtunzini (NM. 8887), Zululand; 8 ♂♂ (NM. 6816), Dukuduku forest near St. Lucia, Zululand; 1 ♂, Hluhluwe Game Reserve, Zululand; 2 ♂♂, 1 ♀ (NM. 9383), Kelso Station; 12 ♂♀ (NM. 2229), Park Rhynie; 10 ♂♀ (NM. 314), Umgababa; 8 ♂♀, Trafalgar near Ramsgate (NM. 8955); 2 ♂♂, 1 ♀ (NM. 4021), Port Edward; 1 ♂, 1 ♀ (NM. 968), Beach Terminus, near Port Shepstone; 2 ♂♂, 3 ♀♀ (NM. 282, 1442, 8968), the Bluff, Durban; 1 ♂ (NM. 9607), Bellair (suburb of Durban); 5 ♂♀ (NM. 8222), Umhlanga Rocks, north coast, Natal; ♂♀ (NM. 6753), Kranzkop, Natal; 2 ♂♂♀ (NM. 7258), Valley of a Thousand Hills, near Drummond, Natal; 2 ♂♂ (NM. 1645), Otto's Bluff, near Pietermaritzburg; 8 ♂♀ (NM. 6227), East London.

Chersastus ruber vulpinus Attems (Fig. 48)

C. vulpinus Attems 1928, Ann. S. Afr. Mus **26**, p. 305, figs. 520-526
C. vulpinus Attems 1934, Ann. Natal Mus. **7** (3), p. 479, Pl. XXV, figs. 54-56.

The ♂ and ♀ types were described from Masiene, a coastal locality about 100 miles NE of Lourenco Marques. It was later recorded by Attems (1934) from Izotsha, a few miles inland from Port Shepstone; as Port Shepstone is in all probability the type locality of *C. ruber* Attems, it seems possible that these specimens identified by Attems as *vulpinus* are in fact *ruber*. The two females from Izotsha in the Museum collection show the three longitudinal rows of black spots which characterise *vulpinus* but these are very weak, especially the dorso-medial row; otherwise the two specimens agree well in colour with *ruber*; the width measurements are 6.9 and 7 mm, with 43 and 44 segments respectively and thus agree slightly better with *ruber* than with *vulpinus* in regard to size. Eyes with about 60 well rounded ocelli, twice their own diameter apart. Legs of the long type, reaching the lateral margin of the tergites when extended laterally, segment V with 1 bristle.

There is some confusion in the illustrations of Attems' later description of 1934; when describing the shape of the sternite of the anterior gonopods, he refers to fig. 54 which is, however, a representation of the posterior gonopods although the sternite had already been illustrated in his original description (1928, fig. 522); he mentions the numerous minute spines of the distal joint of the anterior gonopods, citing fig. 55, but these are better shown in fig. 56 which is, however, not mentioned in the text.

I am unable to agree with Jeekel (1956, p. 96) that *vulpinus* cannot be satisfactorily separated from *coriaceus* Porat. Apart from the fact that Porat was describing a female type, Attems for the most part a male, the two forms differ in the number of segments, width of body and, as pointed out by Schubart (1966, p. 62), in the dense fine sculpture of *coriaceus*, its complete absence in *vulpinus*. Porat's description of the colour and pattern markings is not altogether clear but from what can be understood of his account, there are a number of differences between the two species; the head, antennae and legs of *vulpinus* for instance are a uniform black except for a stripe along the dorsal surface of the legs (more marked in the distal segments) which is a curious greyish white. In this and other respects *vulpinus* is in much closer agreement with *ruber* Attems than with any other species. The stripe is present in both sexes, but absent in specimens from Mid-Illovo, Amanzimtoti, Qolora River mouth (Transkei) and the Nkandhla forest, Zululand, where the legs are a uniform black.

From the geographical viewpoint and from what is known of the extremely localised distribution of nearly all species of *Chersastus* (*digrammus* and *inscriptus* are perhaps the best exceptions), it is hard to believe that the same species is found at such distant localities as Port Shepstone and Masiene with only a single record of its occurrence anywhere between these two places; it is suggested that the Izotsha specimens represent at most a colour variety of the coastal species, *ruber*. The gonopods of a ♂ from Mid-Illovo of what appears to be this species are quite distinct from those figured by Attems in his original discription (1928, figs. 520-523).

Material which seems to be identical with the Izotsha specimens has been recorded from the following localities: 1 ♂ (NM. 9392), Mid-Illovo, South Coast; 4 ♂♀ (NM. 1428), Nkandhla Forest, Zululand; 8 ♂♀ (NM. 8246), Qolora river mouth, Transkei; 1 ♂ (NM. 980), Oribi Gorge, near Port Shepstone, Natal; 1 ♀ (NM. 4507), Amanzimtoti, South Coast, Natal; 1 ♂, 2 ♀♀ (NM. 9628), Beach Terminus, near Port Shepstone (the ♂ of these last-named specimens agrees with *ruber* in colouring but the females better with *vulpinus*).

Chersastus digrammus (Pocock)

Spirobolus digrammus Pocock 1893, Ann. Mag. nat. Hist. (6) **11**, p. 138, pl. 9 fig. 9
Chersastus fasciatus Attems 1928, Ann. S. Afr. Mus. **26**, p. 301 figs. 216-220.

We have 2 ♂♂, 1 ♀ (NM. 9020), from the Alexandria forest, near Grahamstown, which appear to be a very dark form of this species. As stated by Schubart the species certainly does not occur at Durban and Grahamstown is probably the eastern limit of its distribution. I think that its occurrence in the Karroo localities, Prince Albert, Graaf Reinet and Cookhouse must be regarded as doubtful. The small Harpagophorid *Poratophilus punctatus* Attems, which occurs in these parts has a superficial resemblance to *C. digrammus* in its colour pattern.

KEYS TO THE SPECIES OF CHERSASTUS

In constructing a key to the numerous species of the genus, I have been able to draw upon a considerable mass of material collected in the eastern half of Southern Africa. The fauna of Natal and Zululand has been especially well collected and this region should now be among the best known of all the South African provinces.

Schubart and Jeekel have constructed keys to the genus based on colour patterns and from my own experience of collecting, I am convinced that these should work well and be one of the best means for distinguishing the species; since many of them are based on females only, there is sometimes not much alternative, although other characters such as sculpture of the tergites, presence or absence of scobinae, presence or absence of tarsal pads on the posterior legs of the males, are the most useful. The gonopods seem to be rather stereotyped in their general structure and do not provide many details which can be used as distinguishing characters. I have adopted Schubart's useful device of dividing the prozonite into a posterior mesozonite and the covered anterior portion, the prozonite proper, as the two divisions often have quite different and distinctive colouration as well as sculpture.

I have not followed Schubart in dividing the genus into three somewhat artificial groups and which may be rather misleading; the separating off of a group with transverse bands (Group II) and longitudinal rows of spots (Group III) does not always hold good, since many if not most species have transverse bands and in some part of the body spots as well and thus could belong to either group. At the same time characters of colour pattern if judiciously used, can be useful, as in the separation of those species in which the tergites are uniform in colour, either red or black, from others which have a variegated pattern of contrastive markings. I find the distinction between Schubart's "längsgebänderte Arten" and his "längsgefleckte Arten" in his key to Group III rather tenuous; what is actually meant is species with continuous longitudinal stripes on the one hand, and those with longitudinal rows of disconnected spots on the other. I have thus avoided or bypassed such groupings in the key which follows and without seeing the types, have also omitted the following species which are found in the eastern half of Southern Africa; *elegans* Brandt, *formosus* Porat, *coriaceus* Porat and *saussurii* Porat.

KEYS TO THE SPECIES IN THE EASTERN HALF OF SOUTH AFRICA

(Based mainly on colour patterns)

1. Tergites with either close longitudinal or transverse concentric striations, giving the body a matt or dull shagreened appearance, not shiny (fig. 21) 2
——Tergites without close striation, or with only minute punctures and striae, in general smooth and shining 5
2. Tergites with a few very large, coarse, deep, transverse grooves, the areas between them smooth; body segments a uniform blackish-brown; large species **validus** n.sp.
——Tergites with numerous fine, longitudinal or concentrically curved striations .. 3
3. Head and antennae red or yellowish; striae in middle of dorsal surface of tergites parallel, straight (fig. 21) .. .. **rugulosus** n.sp.
——Head or body head and antennae blackish; striae on each side of dorsal mid-line curved concentrically inwards (fig. 24) 4
4. Antennae blackish, legs dark brown, the tarsi yellow; tergites with very sharply defined transverse banding, metazonites dorsally uniformly deep black .. .. **striolatus** Attems
——Antennae and legs ferruginous; metazonites black dorsally with two longitudinal rows of small reddish spots .. .. **strigosus** Porat
5. Colour of tergites uniform 6
——Tergites with a pattern of two contrasting colours 9
6. Body segments red 7
——Body segments black 8
7. Head red, antennae and legs yellowish .. .. **immaculatus** n.sp.
——Head and antennae and legs black .. .. **ruber ruber** Attems
8. Head blackish-brown, legs dark reddish brown, anal valves blackish.. .. .. **sagatinus** Schubart
——Head red, legs bright scarlet, anal valves red .. .. **sanguinipes** n.sp.
9. Head, antennae and legs reddish brown, red or yellow, never black 10
——Head, antennae black, legs usually black or brown with reddish tinge 18
10. Body with contrasting transverse bands of red or black with lighter coloration .. 11
——Body with longitudinal bands or rows of spots 12

11. Metazonites bright red, scobinae absent, tarsal pads occupying only half the segment in posterior legs, fig. 20 .. .. **richardi** n.sp.
——Metazonites black, scobinae present, tarsal pads occupying the whole segment in posterior legs .. .. **fulgidus** n.sp.
12. Tergites in general with 3 longitudinal rows of black markings 13
——Tergites with 1 dorso-median row of dark or light spots 17
13. Last 14-22 legs without tarsal pads 14
——All legs with pads 15
14. Body with 3 very distinct rows of black spots; head part black, part red; collum black with red anterior margin (fig. 46) .. .. **vastus vastus** Attems
——Body with 3 very indistinct rows of black spots; head and collum uniformly dark reddish .. .. **silvanus** Attems
15. Anal segment black, valves reddish, collum black with red borders .. .. .. **diagrammus** (Pocock)
——Anal segment light red, collum mostly red 16
16. A very distinct medio-dorsal black stripe on body; collum red with indistinct black spot in middle of posterior margin; scobinae very weak, much wider than long.. **inyanganus** n.sp.
——Medio-dorsal black stripe on body very weak, ill-defined, collum red with broad black transverse band in middle; scobinae strong, as long as wide **transvaalicus** n.sp.
17. Collum red without markings, prozonites red with a black median spot; legs, antennae reddish-brown .. .. **splendidus** Attems
——Collum grey brown with a pair of light markings; prozonites uniformly grey with bluish tinge; legs light yellow .. .. **elizabethae** Schubart
18. Body red or black with longitudinal rows of red or yellow spots 19
——Body with transverse bands of contrasting colours 23
19. Body black with 1 or 2 paramedian rows of lighter markings 20
——Body red with 3 or more longitudinal rows of black spots 22
20. Anterior half of collum red, posterior black; anal valves red, legs black, last 10 legs not padded .. .. **pusillus** n.sp.
——Collum wholly black or with a pair of red markings in the middle, anal valves black, legs reddish-brown or yellow, all of them padded 21
21. Collum wholly black, tergites with 2 longitudinal rows of yellow spots on each side, legs yellow, scobinae distinct .. .. **decoratus** n.sp.
——Collum black with a pair of reddish spots; tergites with a pair of paramedian red stripes; legs reddish brown; no scobinae .. .. **lugubris** n.sp.
22. Legs mottled black, the tarsi white, strongly contrasting; median process of sternum of anterior gonopod very wide and obtusely rounded distally (fig. 25); all legs with pads .. .. **albitarsis** n.sp.
——Legs entirely black; median process of sternum of anterior gonopod narrow and pointed distally; last 17 legs without pads (fig. 48).. .. .. .. **ruber vulpinus** Attems
23. Collum uniformly red, anal segment light red (fig. 45); tergites of ♀ smooth and shiny as in ♂ .. .. **anulatus** Attems
——Collum red with wide black transverse bands 24

24. Collum with wide black band in the middle; metazonites red, prozonites black; tergites of ♀ with shagreen of fine close striations (as in ♀ of *striolatus* Attems).. **tricolor** n.sp.
——Collum with black band on posterior or anterior margin; metazonites black .. 25
25. Legs blackish brown 26
——Legs yellow brown 27
26. Prozonites reddish yellow; anal segment uniformly reddish yellow or reddish brown; median process of sternite of anterior gonopod reaching far beyond the middle of the gonopod .. .. **rubricollis** Schubart
——Prozonites brown above, black below the pore; anal segment with margins narrowly blackened; median process of sternite of anterior gonopod not reaching the middle of gonopod .. .. **angelicus** Jeekel
27. Collum black with red anterior border, metazonites black; tarsal pads of the ♂ absent in the last 14 pairs of legs .. .. **inscriptus** Attems
——Collum red with wide black posterior margin, metazonites dark brown, tarsal pads absent on the last 6 pairs of legs .. .. **lawrencei** Schubart

The following is an alternative key in which structural characters are used rather than distinctions of colour pattern. It is based primarily on males.

1. Tergites with close longitudinal or transverse striation giving the body a matt or finely shagreened appearance, not shiny 2
——Tergites without close striation, or with minute punctures and striae, in general smooth and shiny 4
2. Body with 39 segments, tergites with few, coarse transverse grooves ♀ of **validus** n.sp.
——Body with 42 or 43 segments; striations numerous, longitudinal or concentric.. 3
3. Striations short, longitudinal, fig. 21 .. .. **rugulosus** n.sp.
——Striations concentric and longer, fig. 23 **strigosus** Porat and **striolatus** Attems (the two species differing in colour).
4. All legs except the first two pairs with pads 5
——The last 6-22 posterior pairs without pads 14
5. No scobinae 6
——Scobinae present 8
6. Body segments 39 .. .. **splendidus** Attems
——Body segments 44-46 7
7. Sternum of anterior gonopod bluntly bifid, fig. 33 .. .. .. **lugubris** n.sp.
——Sternum of anterior gonopod broadly triangular, the anterior angle sharp.. .. **elizabethae** Schubart
8. Sternum not reaching the middle of the anterior gonopod 9
——Sternum reaching the middle of the anterior gonopod 11
9. Sternum broadly truncate, reaching to a third of the gonopod.. **sagatinus** Schubart
——Sternum more or less triangular and bluntly pointed at its apex 10

10. The two distal processes of anterior gonopod not separate, shaped like a bird's head, fig. 29; segment V of anterior legs as long as deep, with 2 apical bristles.. .. **albitarsis** n.sp.

——The two distal processes of anterior gonopod quite separate, the proximal one projecting laterally and very large, fig. 8; segment V of anterior legs abbreviated, much shorter than deep, with 1 apical bristle .. .. **decoratus** n.sp.

11. Sternum distinctly bifid apically, fig. 25 .. .. **bifidus** n.sp.

——Sternum pointed or rounded apically, not bifid 12

12. Sternum very wide, apically rounded-truncate, fig. 5 .. .. .. **inyanganus** n.sp.

——Sternum triangular, bluntly pointed 13

13. Sternum almost parallel-sided, narrow, much longer than wide **digrammus** (Pocock)

——Sternum triangular, as wide as long or wider, fig. 13 .. .. **transvaalicus** n.sp.

14. No scobinae 15

——Scobinae present 17

15. Pads reduced, not reaching apex of tarus in anterior legs, less than half length of tarsus in posterior ones, figs. 19, 20; last 20-22 pairs without pads .. **richardi** n.sp.

——Pads reaching or surpassing apex of tarsus in anterior legs; last 10-16 pairs without pads 16

16. Last 10-12 pairs of legs without pads .. .. **silvanus** Attems

——Last 14 pairs of legs without pads .. .. **vastus** Attems

——Last 16 pairs of legs without pads .. .. **anulatus** Attems

(these three species easily distinguished by colour differences)

17. Last 6-10 pairs of legs without pads 18

——Last 14-22 pairs of legs without pads 22

18. Body with 39 or 40 segments 19

——Body with 42-47 segments 20

19. The distal of the two processes at apex of anterior gonopod cone-shaped, fig. 3; last 6 pairs of legs without pads .. .. **immaculatus** n.sp.

——The distal of the two processes at apex of anterior gonopod rounded and club-shaped, fig. 38; last 10 pairs of legs without pads .. .. **pusillus** n.sp.

20. Tergites of ♀ shagreened, differing from those of ♂ which are smooth and shiny without sculpture .. .. **tricolor** n.sp.

——Sculpture of the two sexes similar 21

21. Sternum more or less triangular, the distal of the two processes at apex of anterior gonopod conical, directed forward, the second smaller, pointed, directed laterally .. .. **lawrencei** Schubart

——Sternum more or less pentagonal, the distal of the two processes of anterior gonopod club-shaped, directed laterally, the second smaller process blunt at apex .. .. **angelicus** Jeekels

22. Segment V of anterior legs abbreviated, its dorsal length equal to or shorter than its width (depth), see figs. 9, 19 23

——Segment V normal, longer than wide, figs. 43, 44 24

23. Scobinae small; inner thickening of anal valves slight, not raised above the surface; tergites with moderate sculpture; sternum of anterior gonopod very long and narrow, fig. 49 .. .. **rubricollis** Schubart

——Scobinae large; inner thickening of anal valves very distinct, raised high above the surface; tergites very smooth with mirror-like reflecting surface; sternum not long or narrow, fig. 35 .. .. **fulgidus** n.sp.

24. Scobinae large and distinct, less than their width apart; segment V of anterior legs with 2 strong apical bristles .. .. **sanguinipes** n.sp.

——Scobinae small, indistinct, three times or more their width apart; segment V of anterior legs with 1 or 2 apical bristles 25

25. Sternum longer than wide, reaching beyond middle of anterior gonopod; eye with 60 ocelli .. .. **ruber vulpinus** Attems

——Sternum as wide as long, reaching to middle of anterior gonopod; eye with 39 or 50 ocelli 26

26. Metazonites smooth and polished; 39 ocelli; segment V of anterior legs as long as wide, with 2 apical bristles; pads of anterior legs surpassing apex of tarsus.. .. **inscriptus** Attems

——Metazonites smooth but with minute punctuation; 50 ocelli; segment V longer than wide, with 1 apical bristle; pads of anterior legs falling a little short of apex of tarsus **ruber ruber** Attems

(The last three species easily distinguished by differences of colour)

Genus **Microbolus** n. genus

In general resembling *Chersastus* but smaller. Pores commencing on segment VI. Somites resembling those of *Chersastus* in general with a pair of feebly developed scobinae; middle part of tergites (mesozonite) with peculiar raised and rounded blister-like excrescences occupying both the dorsal and lateral surfaces and also present on the anal segment. Legs with tarsal pads on all except the posterior pairs, the pads large, passing well beyond the anterior margin of the tarsus.

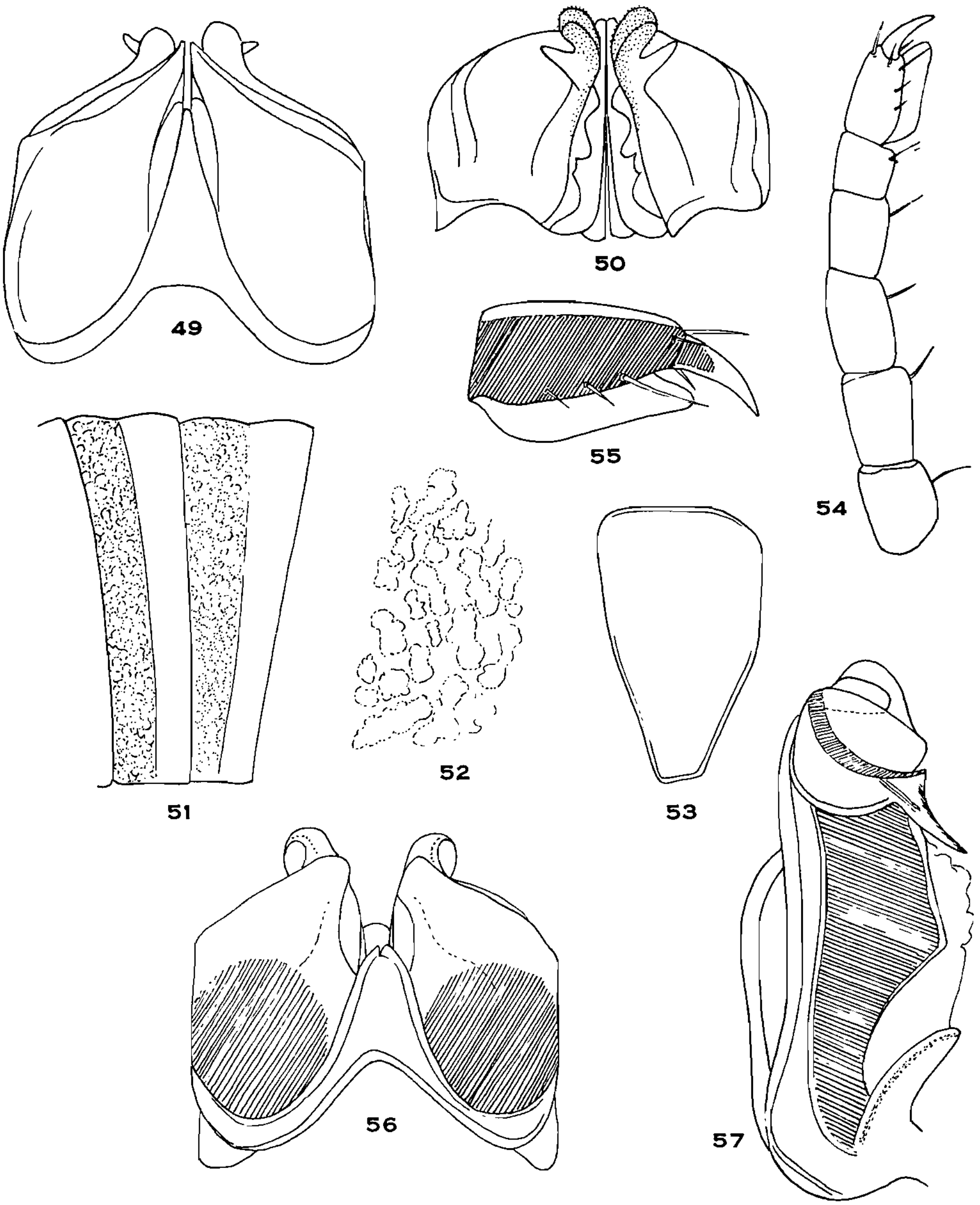
Type: *Microbolus broadleyi* n.sp.

The genus resembles *Chersastus* most closely, differing from it chiefly in the presence of peculiar blister-like formations on all the tergites, such excrescences being absent in all species of *Chersastus*. It is much smaller and has fewer segments than *Metiche*, *Centrobolus* and *Hadrobolus*, which also lack blister-like structures.

Microbolus broadleyi n.sp. (figs. 51-57)

Holotypes, 1 ♂, 1 ♀, paratypes 1 ♂, 3 ♀♀ (NM. 9391) from crevices in granite rock at Bandula, Manica, alt. 2,900 ft., Mocambique, collected D. G. Broadley, April 1965.

♂. *Colour* in general that of a *Chersastus* with transverse annulations, but darker; head, collum and anal segments red, collum with an ill-defined infuscated band on its posterior margin, anal segment with some indistinct blackish markings dorsally in the middle, antennae and legs dull red with a few small ill-defined blackish spots.



Figs. 49-57. *Chersastus rubricollis* Schubart ♂: 49 and 50, anterior gonopods, oral and aboral views. *Microbolus broadleyi* n. gen. et sp. ♂: 52, lateral view of two tergites to show sculpture; 53, detail of sculpture, enlarged; 54, collum in lateral view; 54, ninth leg of ♂ and 55, apical segment of same, enlarged; 56, anterior gonopod, oral view; 57, posterior gonopod.

First three tergites behind the collum reddish for the most part, the remaining somites with the metazonites black, mesozonites reddish, the prozonites covered by the adjacent metazonite yellowish, giving the animal a transversely banded appearance; the area surrounding the pores blackish producing the effect of a continuous lateral blackish stripe. *Head:* Labral sinus distinctly angular, very deep just above the apex, 2 labral pits on each side, clypeus shiny, smooth except for a few very faint irregular transverse furrows; vertex and interocular furrows absent; eyes with about 30 well separated ocelli, 3 times or a little more their width apart, hardly passing beyond the base of the antennae inwards.

Collum and some of the following tergites almost completely smooth, shiny, seen from the side as in fig. 53 fairly strongly narrowed laterally, its anterior but not posterior margins with a distinct marginal furrow.

Body: Pores commencing on segment VI, the first far below the level of those following, all situated just in front of the suture which is absent or very indistinct in most somites. A fine suture just above each pore passing backwards almost to the posterior margin of metazonite, the whole mesozonite with a transverse band of minute, rounded, blister-like excrescences, slightly raised and giving this part of the somite a roughened or even hairy appearance which contrasts markedly with the smooth remainder, figs. 51, 52, the suture forming the posterior boundary of these excrescences which partly conceal 1-3 irregular faint encircling lines; prozonite covered by the succeeding metazonite, quite smooth, with a pair of weak scobinae; metazonites with numerous very fine short longitudinal striae with minute scattered punctures among them. Anal segment with bluntly triangular posterior apex covered dorsally (except in the middle) with modified excrescences as in the other somites, the exposed parts with extremely minute well separated punctures, a very indistinct transverse groove posteriorly; valves strongly convex without raised inner margins, short longitudinal creases in inner half, outer (lateral) half with some sparse but distinct punctures. Sternites with 5-6 very distinct, fine transverse grooves passing right across the segment.

Legs short and weak with tarsal pads on all except the first two and last twelve pairs; the first post-gonopodial pair spined as in fig. 54, the pad passing well beyond the anterior apex of tarsus in anterior segments, fig. 55, not decreasing in length in the posterior ones; segment V short, with 2 apical bristles.

Gonopods: Anterior gonopod as in fig. 56, anterior view, posterier gonopod as in fig. 57.

Dimensions: Total length 27.5, greatest width 3.4 mm.

♀. Much darker in colour, the dark red mesozonites not contrasting so strongly with the black metazonites and the banded effect thus much less noticeable. Shape of collum, striations and punctures of the metazonites, modified excrescences of the mesozonites not perceptibly different from those of the ♂. Legs much shorter and weaker.

Dimensions: Total length 37, greatest width 5.3 mm. Number of segments in both sexes 39 or 40.

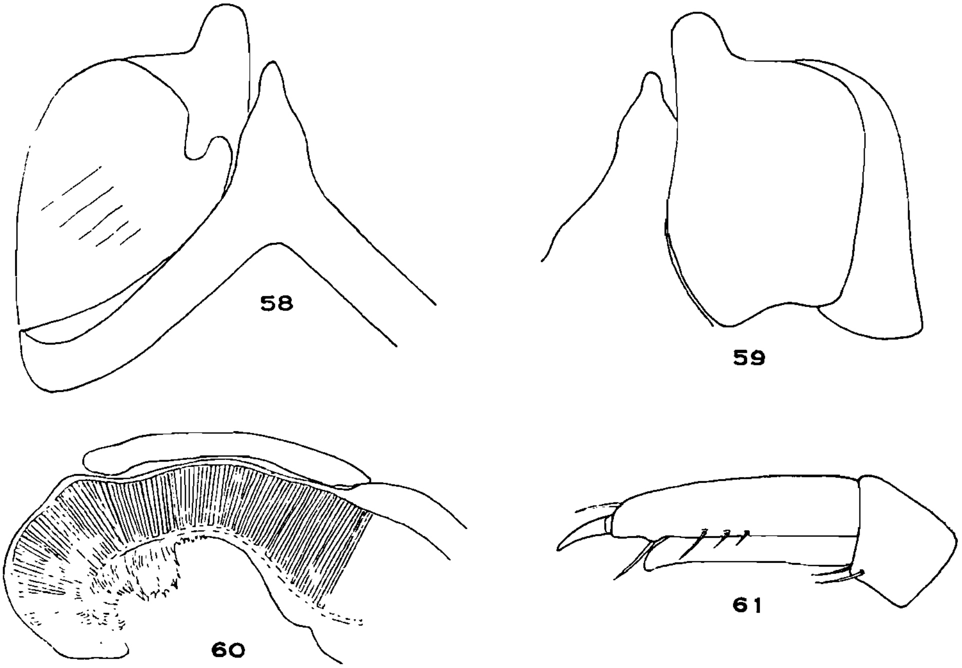
Genus Metiche Attems

Metiche Attems 1909, Wiss. Ergeb. Exped. Kilimandjaro-Meru, **19**, p. 25.

Metiche mossambicense n.sp. (Figs. 58-61)

Holotype, 1 ♂, (NM. 9006), Xiluvo, 65 miles NW of Beira, Portuguese E. Africa, collected D. G. Broadley, Dec. 1963.

Colour: Head deep red, antennae dark red basally, becoming progressively lighter distally, the last three segments light red; legs red, the distal segments bright reddish orange, anal segment and collum black, tergites with metazonites black, mesozonites grey, giving a strongly banded effect, prozonites yellow brown.



Figs. 58-61. *Metiche mossambicense* n. sp ♂: 58 and 59, right half of anterior gonopod, oral and aboral views; 60, posterior gonopod; 61, segments V and VI of ninth leg.

Head and body: Sinus shallow, not sharply angled, 2 supralabral pits, the lateral one less distinct, a deep median furrow from apex of sinus disappearing at base of antennae level, vertex line obsolete, posterior margin of head roughened with a transverse band of microscopic close-set punctures; eyes with 50 ocelli, twice their greatest width apart or slightly less. Collum quite smooth and shiny, the lateral apex triangular, bluntly angled, the anterior margin with a short furrow to the beginning of the eye; tergites quite smooth and shiny, pores very small, almost touching the suture which is represented only by an indistinct groove; prozonites without fine concentric encircling lines but in its posterior half with numerous close-set faint microscopic punctures; no scobinae, no longitudinal or oblique striae at the sides of the tergite even below the pore. Anal segment smooth, shiny, valves similar but becoming progressively more thickly covered with quite large punctures backwards, these most numerous between the marginal thickenings and rest of surface; marginal thickenings high and distinct but rising gradually from the valve surface; middle of anal scale posteriorly very obtuse and bluntly angled.

Legs long, especially the tarsi, all from the third pair backwards with elongate pads, fig. 61, those of the anterior legs falling a little short of the apex, of the posterior legs hardly different; segment V subequal to IV measured dorsally, with 2 bristles.

Gonopods: Anterior gonopod as in figs. 58 and 59, anterior and posterior views; posterior gonopod as in fig. 60.

Dimensions: Total length about 96 mm, width 10.2 mm, number of segments 53.

Remarks: According to O. Kraus (1958), the genus *Metiche* Attems contained three species at the time of writing, the genotype *M. bravensis* (Silvestri 1897) from Somaliland, *M. attemsi* Kraus based on types from Usambara, Tanganyika, which were erroneously redescribed and figured by Attems under the name of *M. bravensis* (Silvestri) in 1909, and a third, *M. tanganyicense*, described by Kraus (1958) from the Rufigi delta, Msala, Tanganyika.

The fourth species of the genus described above differs from *attemsi* in having the legs a lighter red, certainly not "sehr dunkel rotbraun" as stated by Attems. It differs from both *attemsi* and *tanganyicense* in the shape of the sternal process, in the tarsus of the posterior gonopod being much longer and more slender and in the details of the structure of both gonopods. In general it resembles *attemsi* more than it does *tanganyicense*.

The genus *Metiche* thus seems to consist of species confined to the litoral of Eastern Africa from Brava in Somaliland to Beira in Mocambique.

Genus Centrobolus Cook
Centrobolus luctuosus (Peters)

Spirobolus luctuosus Peters 1855, Monatber. Ak. Berlin, **1885**, 80-81.

The type came from Inhambane, Mocambique, and is not represented in the collections of the Natal Museum or any other South African Museum.

Genus Hadrobolus Cook
Hadrobolus crassicollis (Peters)

Spirobolus crassicollis Peters 1855, Monatber. Ak. Berlin, **1885**, 79-80.
Hadrobolus crassicollis, 1899 Cook, in Proc. U.S. Nat. Mus. **21**; 664-665, pl. 52, fig. 2 a-g.

Type locality, "Mocambique"; Cook (*loc. cit.*) redescribed and figured specimens from the "Island of Mocambique".

REFERENCES

ATTEMS, C., 1909. Myriopoda in *Ergebn. Schwed. Zool. Exped. Kilimandjaro*, **19**: 1-64.
——————1928. The Myriopoda of South Africa. *Ann. S. Afr. Mus.* **26**: 1-431.
——————1934. The Myriopoda of Natal and Zululand *Ann. Natal Mus.* **7** (3): 459-522.
BRANDT, T. F., 1841. Recueil de Mem. rel. a l'ordre Ins. Myriopoda. *Bull. Sci. Ac. St. Peterburg*, p. 118.
JEEKEL, C. A. W., 1956. Milliped Miscellany. Pt. III, *Beaufortia*, N. 51: 73-99.

KOCH, L., 1865. Beschreibung neue Arachmiden and Myriopoden *Verh. Zool. bot. Ges. Wien*, **15**: 884.

KRAUS, O., 1958. Myriapoden aus Ostafrika (Tanganyika Territory). *Veröff. Übersee-Mus. Bremen*, 3 (1): 1-16.

LAWRENCE, R. F., 1953. The biology of the cryptic fauna of forests with special reference to the indigenous forests of South Africa, 1-408, 160 figs. A. A. Balkema, Cape Town.

——————1966. The Myriopoda of the Kruger National Park. *Zool. Afr.* **2** (2): 225-262.

POCOCK, R. I., 1893. Report on the Challenger expedition to the Bermudas. *Ann. Mag. Nat. Hist.* (6) XI: 121-142.

PORAT, C. O., 1872. Myriopoda africae australis, Pars. II, Diplopoda, *Ofvers. Vet. Ak. Forh. 28*, N. 9: 3-46.

——————1893. Myriopoder fran Vest och Syd-Afrika, *Bih Sv. Ak. Handl*, **18** (iv): 1-52.

SCHUBART, O., 1966. Diplopoda III. *Anim. Life in S. Africa*, **12**: 1-227.

SILVESTRI, F., 1897. Chilopodi e Diplodi raccolti dal. Cap. V. Bottego durante il suo secondo vaggio nella regione dei Somalie dei Galla. *Ann. Mus. Genova, 17:* 301-307.

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